Metals Review
THE NEWS DIGEST MAGAZINE
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VOLUME XXII, No. 8 FEATURING: WELDING AND BRAZING August, 1949

(Continued on Back Cover)

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Metals Review

THE NEWS DIGEST MAGAZINE

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VOLUME XXII, No. 8 — **August, 1949**

A.S.M. REVIEW OF METAL LITERATURE

SPECIAL FEATURE

METAL SHOW

IMPORTANT LECTURES

DEPARTMENTS

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Welding and Brazing

A Survey of a Year's Literature Shows a Concentration of Attention on Procedures and Techniques

By David C. Martin

RECENT LITERATURE on welding and brazing has to a large degree concentrated on procedures and techniques of production. The pressure of the war years and the economic necessities of the postwar years impelled the most efficient use of available methods of production, as well as the development of new methods. As a result, use of welding has increased and methods which a few years ago were unknown or not considered usable have been put into operation. New or improved electrodes for use with mild and alloy steels have been introduced. Methods of welding and brazing the light metals and other nonferrous alloys have been brought to a stage of high development in the past few years. The use of resistance welding has broadened, and attention is being paid to the power costs of this method. Use of welding for foundry salvage work has expanded, and more cast iron is being welded than ever before.

Metal-Arc Welding

During the past year, a number of companies have placed electrodes of the low-hydrogen type on the market (A.W.S. Classes EXX15 and EXX16). These electrodes prevent underbead cracking in steels of high hardenability and diminish porosity in the sulphur-bearing steels. They work very well where yield strengths of 60,000 to 70,000 psi. are required in the steel. Electrodes are available for depositing weld metals up to 90,000 psi. yield. However, where higher yield strengths (120,000 psi. and over) are obtained by subsequent heat treatment, very few electrodes will fill the bill. Tarnopol describes tests on heat treated butt joints made with such an electrode (22b-218, Aug. 1948).* Yield strengths were as high as 215,000 psi. In general, trouble is encountered with hot cracking or hairline cracking when these high-strength electrodes are used.

About three years ago a new type of electrode was introduced in Europe. It has a heavy covering which contains a large amount of powdered iron. It burns off with a deep cup at the tip and if the coating is kept in contact with the workpiece the electrode maintains the correct arc length itself. It is called a contact electrode. Supplies are now available in this country corresponding to A.W.S. Classes E6012, E6020, and E6015 (22a-189, Oct. 1948). An interesting use is in making vertical fillet welds by welding down. Good penetration and fillets of normal contour are obtained in this position, as contrasted to the poor penetration and concave fillets usually obtained with normal electrodes.

Hard facing with the metal arc has generally been restricted to manual procedures, except where medium-carbon or low-alloy steels are deposited, because the harder and more abrasion resistant hard facing alloys have only been available in short electrodes. Now, however, they are being made in coil form (22b-98, April 1948) for use with automatic welding. The coil is a steel tube filled with appropriate alloying elements and of sufficient flexibility to be used in either submerged-arc or other types of automatic machines. Tungsten carbide filled coils are now available, in addition to several alloy materials.

Nonferrous electrodes (nickel and nickel alloys) for the repair of gray iron castings have found increased use during the past year. Weld metal deposited by these electrodes has a good color match with cast iron and is also machinable. By using the heat effect of cover passes, welds can also be produced with no hard zone in the base metal. In thin sections, preheat can take the place of cover passes (22b-42, March 1948). Gassy castings can cause porous welds but such castings can be degassed by torch heating or by furnace heating. Torch heating can also be used to remove grease or oil from castings. The Automotive Welding Committee of the American Welding Society has submitted for approval recommended practices for salvaging gray iron castings (15b-29, July 1948).

In fabricating equipment for the chemical, food, and petroleum industries, clad steel can frequently be substituted for the homogeneous stainless steels and nickel alloys. These clad steels reduce material costs and are easily fabricated by welding if some simple precautions are taken. The sealing bead on the clad side must be deposited without dilution from the carbon-steel backing and the bottom pass on the carbon-steel side must be deposited so that the alloy pickup is negligible or cracked welds may result. Williams (22b-239, Sept. 1948) discusses the step-by-step procedures for welding clad steels and outlines joint preparation, electrodes used, welding sequence, and other factors.

Schaeffler (22a-151, Aug. 1948) discusses the use of stainless steel electrodes for joining alloy and carbon steels of various types, and shows the relationship between the microstructure of the weld and the quality of the weld. A system is presented by which the final weld-metal composition can be predicted. This system employs chromium and nickel equivalents and diagrams based on these equivalents. Most of the alloys that affect microstructure are considered and the chromium or nickel equivalent factors given.

Gas-Shielded Arc Welding

The inert-gas-shielded arc process has shown in the past year that it will become one of the major factors in the welding field. It is now used for production welding of copper and copper alloys, nickel and nickel alloys, and stainless steel, in addition to aluminum and magnesium.

Alternating current is now generally used for welding the light alloys. Direct current with the electrode positive (reverse polarity) produces good cleaning action when used with an argon shield but, when a tungsten electrode is used, a drop of molten tungsten forms on the electrode tip and is likely to drop off into the weld. Also, the equipment for producing the high currents necessary when welding thick plates is less expensive if alternating current is used.

The cleaning action observed when argon is used for the shielding gas occurs only when the workpiece is

*The literature references are cited by the corresponding item number in the Review of Current Metal Literature instead of repeating the entire title, author, and source; this information can be obtained by referring to *Metals Review* for the month indicated.

negative. Better penetration is also obtained under this condition. Consequently, when alternating current is used, the cleaning action occurs only on the reversed-polarity cycle.

However, when welding aluminum and magnesium, a partial rectification occurs in the arc and the current is lowered during the reversed-polarity cycle. This, in effect, causes a straight-polarity direct-current component to appear and both the cleaning action of the arc and its penetration are reduced. The direct-current component also saturates the transformer core and results in a low power factor and reduction in the rated capacity of the welding machine.

The direct-current component can be overcome by inserting storage batteries or capacitors in the welding circuit in series with the arc. Capacitors are generally the best choice since they suppress all of the direct-current component, and do not require as much maintenance as batteries. Gibson and Rothschild (22d-71, Dec. 1948) show the relation between the amount of direct-current component, and such factors as bead penetration, fusion, arc voltage, and cleaning action. Tuthill (22d-67, Dec. 1948) and Herbst (22a-186, Oct. 1948) also discuss the effectiveness of balanced (alternating) current and unbalanced (alternating plus direct-current component) current for welding the light alloys. The consensus is that with balanced current greater penetration, smoother, better-shaped and cleaner welds are obtained, and less shielding gas is required.

Mechanization of the inert-gas-shielded arc process increases the efficiency and effectiveness of this method. The welding torch is moved on some type of carriage and no arrangements are made for controlling arc length automatically. The filler wire, when used, is fed in at a constant rate and no automatic control is used. High output and high uniformity are obtained and finishing costs are low, but the welding equipment must be carefully designed and jigs and fixtures well planned. The joint must be well prepared and the best position for welding determined (22a-60, April 1948). Benua (22c-13, Aug. 1948) describes the mechanized welding of tinned red brass using a carbon electrode and helium for a shielding gas.

In the past, helium has not been used as extensively as argon for a shielding gas because higher gas flows are required and welding troubles have been caused by the low purity of the helium available. The Bureau of Mines has announced that the welding grade helium now being supplied has a purity of 99.8% or better as compared with 98.2% for the former grade (22b-251, Oct. 1948; 22d-84, Jan. 1949). In some instances, better penetration and higher welding speeds can be obtained with helium, and now that the high-purity gas is available there is no reason for not taking advantage of these factors.

Pilia (22a-258, Jan. 1949) describes the inert-gas-shielded arc process for making spot welds. A tungsten electrode is used in a specially designed torch, and the gas flow and arc duration are controlled by a timer. The arc melts through the top member of the joint and penetrates into the lower member. When the arc is interrupted, the molten pool solidifies producing a sound, strong plug weld. The process is at present widely used in the automotive industry for body construction and produces sound welds at high rates. One of its outstanding advantages is the ability to make spot welds in difficult places. Since little or no pressure is needed, access to one side of the joint only is required.

Welding of thick sections of aluminum in the vertical and overhead position has always been difficult. In the inert-gas-shielded arc-welding process as normally used, the necessity of feeding filler rod manually and the slow rate of travel required in thick sections were troublesome. These difficulties are overcome in a new process which uses a consumable bare aluminum electrode rather than a tungsten or carbon electrode (22a-244, Jan. 1949).

The process consists of feeding a wire through a suitable holder equipped with a nozzle which directs the shielding gas around the arc and weld pool area. The arc is maintained between the wire and workpiece. Equipment may be either automatic or manual although the manual equipment is in reality semiautomatic since the operator is only required to move the gun. The arc length, once chosen, is maintained automatically. Much higher current densities are used than with other aluminum welding processes, resulting in high deposition rates and deep penetration.

Resistance Welding

While much has been published on the resistance welding of aluminum, this is not so for steels and some of the other metals and alloys—no doubt because they are easier to weld satisfactorily than aluminum. Within the past few years, however, more attention has been paid to the resistance welding of steels. The effect of steel composition, the welding variables (weld time, electrode force, current) have been discussed and general procedures have been developed. Nonetheless, it seems that a large amount of this information has been developed empirically, and only recently have attempts been made to determine the relation of the fundamental factors to weld quality so that a direct attack can be made on various problems.

One of the reasons for this is that insufficient instrumentation is used in solving production problems. The British Institute of Welding has been interested in this problem for some time and has published a report on the measurement of the main variables in resistance welding machines (22a-46, March 1948). They have also published a list of recommendations for the spot welding of steel sheet from 20 to 14 gage (22b-350, Jan. 1949). These recommendations set forth the absolute values of each of the main welding variables for producing optimum results. The most valuable attribute of these recommendations is that they make it possible to transfer established settings from one machine to another.

In this country, Harkins (22c-22, Nov. 1948) has done the same thing for nickel and nickel alloys. He gives welding schedules for sheets of various thicknesses and schedules for welding dissimilar thicknesses. One of the major problems in welding dissimilar thicknesses is in locating the nugget properly. However, by using electrodes of the proper size and composition, a 0.005-in. sheet can be successfully welded to a 0.125-in. sheet.

Spot welding aluminum requires certain pressure, current, and voltage characteristics that are best obtained from one or another of the stored-energy machines. For welding steel, however, this type of equipment is not so satisfactory, and machines which operate on single-phase current are generally used. Such equipment, because of its low power factor and high short-time power demand, is very inefficient. Machines designed to operate from a three-phase source are much more efficient. Smith and Blair (22a-206, Nov. 1948) describe a machine which uses dry disk rectifiers for three-phase operation. The balanced three-phase load of such machines and their high power factor lower their kva. demand. They also produce secondary wave shapes that are more desirable for welding certain materials. Three-phase balanced-load resistance welding is also discussed by Burton (22a-129, July 1948).

In the current preoccupation with the problems of using large equipment it is sometimes forgotten that the resistance welding field includes as one of its facets the welding of very small components (22c-25, Dec. 1948). In the radio tube industry thin-gage sheet and wires of nickel and tungsten are resistance welded. The machines used have a maximum of 50 lb. electrode force available and a capacity of 5 kva. alternating current or 200 microfarads.

The static shear strength of spot welds is quite good and by proper design exceptionally good joints can be obtained. However, when aluminum is used, the tension fatigue strength of spot welded joints may be very low (10 to 15% of the shear strength) even in sound welds. The fatigue strength can be increased by applying high pressures to the spots

after welding is completed (22a-135, July 1948). This may be done either in the welding machine or in special press equipment. Application of pressure to spot welds may improve their fatigue strength from 250 to 300% (when tested to 10,000,000 cycles).

Flash Welding

While the flash welding process has been in use for more than 20 years, little information of a fundamental nature is available. This lack of knowledge is probably a result of two things. First, the process presents few problems when used with mild steel, whose properties are not greatly changed by the heat involved and whose oxides are not particularly refractory. Second, the flash welding process involves such a large number of variables that any systematic study is tedious. Materials which are affected by the thermal cycle or do have refractory oxides can be flash welded, but many important variables must be considered in choosing the optimum conditions, and to select these experimentally would be nearly impossible. Even then, the results could only be applied to the sections studied and equipment used.

Curran, Patriarca, and Hess (22d-83, Jan. 1949) worked with aluminum to determine the effect of several variables on the temperature distribution during flashing in the pieces being welded. Relationships were determined between the temperature distribution in the work-pieces and secondary voltage, burn-off distance, flashing velocity, and clamping distance. A mathematical expression was developed for the temperature distribution, which should be applicable to materials other than aluminum as well. It was also found that the average flashing interface temperature is dependent on burn-off distance. This has a practical application in that longer flashing distances will cause higher interface temperatures and will permit the removal of oxide films from the interfaces with less upset travel and less upset force.

Brazing

Brazing is a rapid, low-cost method of production fabrication used in the manufacture of steel, copper, and copper-alloy components. Brazing methods and materials have also been developed within the past few years for aluminum alloys.

Aluminum can also be bonded to ferrous materials by brazing. Whitfield and Sheshunoff (22a-152, Aug. 1948) describe the procedure for attaching aluminum fins to steel parts such as cylinders, aluminum gears to steel hubs, and extended surfaces of aluminum to cast iron space heaters. The ferrous material is coated with aluminum or zinc and then the aluminum fins are

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die cast onto the coated part. Aluminum-coated steel parts can also be brazed to each other, thus preserving the corrosion resistance of the aluminum surface.

Klain describes the brazing of M-1 magnesium alloy using magnesium-aluminum-zinc alloys as brazing materials (22d-38, Aug. 1948). Chloride base fluxes are used and brazing can be done by either furnace, torch, or flux dip methods. The joints have smooth surfaces and meniscus-type fillets, and no finishing is required. At present, only the M-1 alloy can be brazed, but it is hoped that further research will extend the use of this fabrication procedure to the other magnesium alloys.

Pressure Welding

Welding by the application of heat and pressure is an ancient art. Blacksmiths used this way of welding long before other welding methods were even thought of. In more modern times, the process has been greatly refined and widely used. It has also been known for some time that certain materials could be welded by the application of pressure alone, although, until recently, this method has had little commercial use. Several articles during the past year describe its use in the "cold welding" of aluminum (22a-154, Aug. 1948; 22c-14, Aug. 1948; 22c-29, Jan. 1949; 22d-44 Jan. 1949). Welding is accomplished by applying pressure with dies or rolls, which cause considerable deformation in the pieces being welded. Spot welds, seam welds, and circular welds (made with ring-type dies) can be produced. For aluminum, the important factors are cleaning (to reduce the oxide film to a minimum) and the design of the dies (to apply the pressure over a relatively narrow strip). The process has been used for lap welding, and for making aluminum tubing. Alumnum has also been welded to copper using dies designed to compensate for the difference in strength of the two materials.

Weldability

Nearly every variable of the welding procedure and the material being welded must be considered in the evaluation of weldability. This makes the term a broad one, and no general definition can be given. The subject can be considered in two categories, however—namely, the ability to produce a successful weld, and the usability or performance of the finished weldment.

A number of the components used in gas turbines are welded. Some of these present no problems, but the welding of turbine blades to wheels presents a serious problem of weld cracking. Turbines are made up of a solid wheel—generally a high-alloy steel—to which are fastened a number of individual blade segments. These "buckets" are generally made of one of the so-called superalloys such as Vitallium. When they are welded to the wheel, the joints may contain cracks which are extensions of the discontinuities between each bucket and its neighbors. Linnert (22a-190, Oct. 1948) discusses the use of wheel and bucket replicas for investigation of interbucket extension cracking. Tests were made with submerged and metal-arc welding, and he concludes that the severity of cracking is related to the variations in weld composition caused by the wheel and bucket materials. These composition variations cause interdendritic and micro segregation which determine whether cracking is severe or not.

Cracking may also occur when magnesium is welded. George (22d-26, July 1948) shows that calcium is the cause of cracking in the M and FS-1 alloys because it is responsible for the formation of low-melting-point envelopes around the grains. Cracking can be eliminated in the M alloy by keeping the calcium content below 0.15%. Some calcium is required in the FS-1 alloy for good rolling and forming properties, and the cracking problem can be overcome in this alloy by using filler material with a lower melting point than that of the base metal (J-1 and O-1 alloys).

Turning to the performance of welded structures, considerable attention has been paid to the failure of some of the all-welded ships built during the war, failures of pressure vessels, and failures of other types of structures. The magnitude of the residual stress in weldments (22b-273, Nov. 1948; 22b-253, Oct. 1948),

(*Continued on page* 14)

Forum Discussions, Economy Theaters Carry Theme of Cost-Cutting Congress

"Economy in Production", the theme of the 31st National Metal Congress and Exposition, will be the general subject of two new features scheduled for the week of the Congress. A series of eight round-table forum discussions will bring to light the economical solutions to many production problems, while a group of industrial motion pictures will be shown daily in various "Economy Theaters" throughout the exhibit hall.

The Congress and Exposition will be held in Cleveland the week of Oct. 17 through 21, with the entire facilities of Cleveland's huge Public Auditorium reserved for the 350-odd exhibits provided by the country's leading metal producing and metalworking firms. The round table discussions will be conveniently housed in the various meeting rooms provided by the auditorium, while the Economy Theaters will also have showings in rooms adjacent to the exhibit area.

Each of the round table forums will be conducted by a panel of experts in a fashion patterned after the University of Chicago's well-known radio program. Solutions to specific production problems will be presented, and each of the panel experts will bring up related problems for possible solution in a round table discussion. It will be an audience participation program, with questions and discussion invited from the floor.

Among the topics to be discussed at these round table sessions are such important items as "Cost Cutting by Use of More Precise Castings or Formed Shapes", "Cost Cutting by Improved Heat Treatment Operations", "Economy-in-Production in Brazing, Soldering and Welding of Subassemblies", "Economy-in-Production Through Improved Welding Techniques and Equipment", "Economy-in-Production Through the Use of Tailor-Made Alloys and More Adaptable Mill Products", "Economy-in-Production Achieved by the Metallurgist in Machine Shop Operations", and "Economy-in-Production Through Better Cleaning and Surface Finishes".

Avoid Delay at the Registration Desk

See page 61 for Advance Registration Coupon; your badge giving admittance to the National Metal Exposition will be mailed to you direct.

Production savings and short cuts will also play starring roles in the Economy Theaters. A wide variety of subjects will be covered in this selection of industrial motion pictures which will be provided by the Metal Show exhibitors. The presentations will be limited to those which have a definite contribution to production savings.

Each film will be allotted a specified period in one of the theaters, and schedules of showings will be prominently posted. All of the films will have as their principal appeal the reduction of production costs through better methods, products or equipment.

The economy theme will also be carried through the booths of the various exhibitors, who will demonstrate the "know-how" of metal applications and the "show-how" of metal treatment and fabrication.

In addition, technical sessions will be held by the cooperating technical societies. These include the American Society for Metals, American Welding Society, Metals divisions of the American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing.

Cleveland's Huge Public Auditorium Contains Over 250,000 Sq. Ft. of Exhibit Space, Together With Scores of Smaller Halls, Conference and Meeting Rooms, and Other Areas Suited to Convention Operations. This $10,000,000 auditorium was the first of such structures to be built in the United States, and the success of the venture set the pattern for scores of other public auditoriums in leading cities from coast to coast. It has been the scene of the National Metal Exposition on seven previous occasions—1925, 1929, 1936, 1940, 1942, 1944 and 1946

A.S.M. Program Includes Two Lecture Courses and Two-Day Symposium

A well-balanced program covering a wide variety of metallurgical subjects is planned by the American Society for Metals for the National Metal Congress and Exposition in Cleveland, Oct. 17 through 21, 1949.

The regular daily technical sessions on Monday through Friday will be supplemented by a two-day symposium on Saturday and Sunday, Oct. 15 and 16, and two series of educational lectures. The balanced diet offered by the daily sessions will include such general subjects as alloy steels, oxidation of metals, quenching, high-temperature metallurgy, transformations in steel, temper brittleness, stainless steels, and mechanical metallurgy. An outstanding program on atomic energy metallurgy is scheduled for Friday morning, Oct. 21.

Subject of the Saturday and Sunday symposium is "Thermodynamics in Physical Metallurgy". Clarence Zener, professor of physics, Institute for the Study of Metals, University of Chicago, is organizer and chairman of the symposium series, which will include papers by 15 of the country's leading metallurgists, mathematicians, physicists and researchers. The complete program of the symposium will be published in the September issue of *Metals Review*.

"Machining—Theory and Practice" will be the subject of one of the educational series, scheduled for four meetings on Monday and Tuesday. Thirteen lectures will be presented, with Hans Ernst, director of research, Cincinnati Milling Machine Co., leading off the series by presenting a "Symposium Keynote".

The second educational series will consist of three lectures on the subject of "Stress-Corrosion in Metals". This course will be presented Wednesday afternoon and evening.

Complete programs of both lectures series will also be published in the September issue.

As indicated in the program opposite, most of the papers on the regular technical sessions will be preprinted for distribution to A.S.M. members.

Technical Program

Cleveland, Oct. 17-21, 1949

Tentative Program of Technical Papers for National Metal Congress, Numbered for Ordering of Preprints

Monday, Oct. 17—9:30 A.M.

Alloy Steels Session—I

1. **Tensile Properties of a Heat Treated Low-Alloy Steel at Subzero Temperatures,** by E. J. Ripling, research associate, Case Institute of Technology.
2. **Relationship of Inclusion Content and Transverse Ductility of a Chromium-Nickel-Molybdenum Gun Steel,** by John Welchner, metallurgical engineer, and Walter G. Hildorf, metallurgical consultant, Timken Roller Bearing Co.
3. **The Effect of Vanadium and Carbon on the Constitution of High Speed Steel,** by Donald J. Blickwede, head, high temperature alloys section, Naval Research Laboratory; Morris Cohen, professor of physical metallurgy, Massachusetts Institute of Technology; and George A. Roberts, chief metallurgist, Vanadium-Alloys Steel Co.
4. **Unnotched Impact Strength of High Speed Steels,** by Arthur H. Grobe, research metallurgist, and George A. Roberts, chief metallurgist, Vanadium-Alloys Steel Co.

Monday, Oct. 17—2:00 P.M.

Alloy Steels Session—II

5. **Effect of Boron and Kind of Boron Addition Upon the Properties of Steel,** by R. A. Grange and W. B. Seens, members of staff, U. S. Steel Corp. Research Laboratory; W. S. Holt, metallurgist, Jessop Steel Co.; and T. M. Garvey, metallurgical department, Carnegie-Illinois Steel Corp.
6. **Characteristics and Properties of Cast Low - Chromium - Molybdenum Steels,** by N. A. Ziegler, research metallurgist, W. L. Meinhart, assistant research metallurgist, and J. R. Goldsmith, metallurgical engineer in charge of research foundry, Crane Co.
7. **Iron-Manganese and Iron-Manganese-Nickel Alloys,** by Irvin R. Kramer, head, mechanics and materials branch, Office of Naval Research; Stewart L. Toleman, metallurgist, Naval Research Laboratory; and Walter T. Haswell, metallurgist, Latrobe Steel Co.
8. **Metallurgical Factors Affecting the Magnetic and Mechanical Properties of Iron-Cobalt Alloys,** by J. K. Stanley, magnetic dept., Westinghouse Electric Corp.

Tuesday, Oct. 18—9:30 A.M.

Oxidation Session

9. **The High-Temperature Oxidation of Manganese,** by R. S. Gurnick, research engineer, Thompson Products, Inc.; and W. M. Baldwin, Jr., research professor, Case Institute of Technology
10. **Determination of Oxygen in Metals by the Vacuum Fusion Method,** by R. K. McGeary, J. K. Stanley, and T. D. Yensen, Westinghouse Research Laboratories
11. **Methods of Determining Vapor Pressure of Metals,** by Rudolph Speiser, staff member, Department of Metallurgy, and H. L. Johnston, director, Cryogenic Laboratory, Ohio State University.
12. **An X-Ray Study of the Scale Formed on Iron Between 400 and 700° C,** by O. A. Tesche, Government Metallurgical Laboratory, University of the Witwatersrand, Johannesburg, S. Africa

Tuesday, Oct. 18—9:30 A.M.

Quenching Session

13. **A Quench Cracking Susceptibility Test for Hollow Cylinders,** by Cyril Wells, member of staff, metals research laboratory, Carnegie Institute of Technology; C. F. Sawyer, metallurgist, Vanadium-Alloys Steel Co.; I. Broverman, Los Alamos Scientific Laboratory; and R. F. Mehl, director, metals research laboratory, Carnegie Institute of Technology.
14. **An Engineering Analysis of the Problem of Quench Cracking in Steel,** by J. W. Spretnak, associate professor of metallurgy, Ohio State University, and Cyril Wells, member of staff, metals research laboratory, Carnegie Institute of Technology.
15. **Pre-Bore Quench for Hollow Cylinders,** by J. W. Spretnak, associate professor of metallurgy, Ohio State University; and C. C. Busby, metals research laboratory, Carnegie Institute of Technology
16. **Statistical Methods for Evaluating the Quality of Certain Wrought Steel Products,** by Edwin G. Olds, associate professor, mathematics department, and Cyril Wells, member of staff, metals research laboratory, Carnegie Institute of Technology.

All of the numbered papers herewith will be preprinted for distribution to members of the American Society for Metals. (Those papers marked by an asterisk will not be preprinted.) The society will print only 10% in excess of the number of orders for preprints in the office on press date, and this excess 10% will be sent out as long as it lasts. Order by number from this list before Sept. 1, 1949.

Tuesday, Oct. 18—2:00 P.M.

High-Temperature Metallurgy Session

* **Influence of Strain Rate and Temperature on the Creep of Cold Drawn Ingot Iron,** by W. D. Jenkins and T. G. Digges, chief, thermal metallurgy, National Bureau of Standards

17. **Stability of A.I.S.I. Alloy Steels at Elevated Temperatures,** by A. B. Wilder, chief metallurgist, National Tube Co.; and J. O. Light, chief metallurgist, Lorain Works, National Tube Co.
18. **On the Extrapolation of Short-Time Stress-Rupture Data,** by N. J. Grant, associate professor of metallurgy, and Albert G. Bucklin, research assistant in metallurgy, Massachusetts Institute of Technology.
19. **The Tungsten-Iridium Thermocouple for Very High Temperatures,** by Walter C. Troy, supervisor, and Gary Steven, research metallurgist, metals department, Armour Research Foundation

Wednesday, Oct. 19--10:00 A.M.

A.S.M. Annual Meeting

* **Edward DeMille Campbell Memorial Lecture,** by E. H. Dix, Jr., assistant director of research, Aluminum Co. of America

(*Continued on next page*)

Wednesday, Oct. 19—2:00 P.M.

Transformation and Temper Brittleness Session

20. **Measurement of Retained Austenite in Carbon Steels,** by B. L. Averbach, assistant professor, L. S. Castleman, research assistant, and M. Cohen, professor of metallurgy, Massachusetts Institute of Technology
21. **The Effect of Alloying Elements on the Transformation Characteristics of Induction Heated Steels,** by J. F. Libsch, assistant professor of metallurgy, and W. P. Chuang and W. J. Murphy, graduate students, Lehigh University
22. **Influence of Composition on Temper Brittleness in Alloy Steels,** by A. P. Taber, Colonel, Ordnance Department; J. F. Thorlin, Lt. Colonel, Aberdeen Proving Ground, and J. F. Wallace, metallurgist, Watertown Arsenal
23. **Isothermal Temper Embrittlement,** by L. D. Jaffe and D. C. Buffum, Watertown Arsenal Laboratory

Thursday, Oct. 20—9:30 A.M.

Stainless Steels Session

24. **A Bar-Bend Test and Its Application to Stainless Steel,** by C. A. Zapffe, R. L. Phebus and F. K. Landgraf, consultants
25. **Creep and Rupture of Several Chromium-Nickel Austenitic Stainless Steels,** by G. V. Smith, E. J. Dulis and E. G. Houston, U. S. Steel Corp. Research Laboratory
26. **The Effect of Sigma Phase on the Short-Time High-Temperature Properties of 25 Chromium, 20 Nickel Stainless Steel,** by Glen J. Guarnieri, James Miller and Frank J. Vawter, Cornell Aeronautical Laboratory, Inc.
27. **Stress-Corrosion of a Stainless Steel Compressor Through Unbalanced Dynamic Loading and Exposure to a Mildly Corrosive Solution,** by Frank W. Davis, chief metallurgist, E. B. Badger & Sons Co.

Thursday, Oct. 20—2:00 P.M.

Mechanical Metallurgy Session

28. **New Equipment for Damping Capacity, Elasticity, and Fatigue Testing and the Correlation of These Properties for Mild Steel,** by B. J. Lazan, professor and head, department of materials engineering, Syracuse University
29. **Effect of Steady Stress on Fatigue Behavior of Aluminum,** by J. A. Sauer, head, department of engineering mechanics, Pennsylvania State College, and D. C. Lemmon, engineer, General Electric Co.
30. **New Criteria for Predicting the Press Performance of Deep Drawing Sheets,** W. T. Lankford, S. C. Snyder and J. A. Bauscher, research and development division, Carnegie-Illinois Steel Corp.
31. **Fractographic Study of Deformation and Cleavage in Ingot Iron,** by C. A. Zapffe and C. O. Worden, consultants

Friday, Oct. 21—9:30 A.M.

*Atomic Energy Metallurgy Session**

- * **The Metallurgy of Beryllium,** by A. R. Kaufmann, Massachusetts Institute of Technology
- * **The Effects of Radiation on Materials,** by Sidney Siegel, atomic power division, Westinghouse Electric Corp., and Douglas Billington, Naval Research Laboratory
- * **Some Aspects the Metallurgy of Uranium**
  subdivided as follows:
  Uranium Crystal Structure, by C. W. Tucker, Knolls Atomic Power Laboratory
  Elastic Constants of Uranium, by Henry Laquer, Los Alamos National Laboratory
  Some Uranium Phase Diagrams, by H. A. Wilhelm, Ames Laboratory

Friday, Oct. 21—2:00 P.M.

Nonferrous Session

32. **Fabrication and Mechanical Properties of Ductile Zirconium,** by E. T. Hayes, physical metallurgist, E. D. Dilling, metallurgist, and A. H. Roberson, metallurgist, Bureau of Mines, Northwest Electrodevelopment Laboratory
33. **A Study of Arc-Melted Molybdenum-Rich Chromium-Molybdenum Alloys,** by Harold D. Kessler, research metallurgist, and M. Hansen, Armour Research Foundation
34. **Effects of Quenching Rate and Quench-Aging on the Tensile Properties of Aluminum Alloy 61S,** by R. C. Lemon, research metallurgist, and H. Y. Hunsicker, assistant chief, Cleveland Research Division, Aluminum Co. of America
35. **Preparation of Metal Single Crystals,** by A. N. Holden, research laboratory, General Electric Co.

* Not preprinted.

Nixon's Death Ends 40-Year Career at Bausch & Lomb

Ivan L. Nixon, vice-president in charge of Bausch & Lomb Optical Co.'s scientific instrument division, died on June 25 following a brief illness. He was 66 years old and had been associated with Bausch & Lomb for more than 40 years.

Mr. Nixon graduated with a B.S. degree from Kansas State College in 1903, and was appointed assistant New York State entomologist. Four years later he joined the instrument sales division of Bausch & Lomb, and a short while later was placed in charge of the company's industrial sales division. In 1933 he became sales manager of the scientific instrument division, and shortly after World War II was appointed manager of that division. He was elected vice president of the company in 1947.

During his long association with Bausch & Lomb he contributed materially to the development of many types of scientific instruments, including photomicrographic and metallographic equipment.

Two General Types Of Low-Alloy Steels Are Cr-Si and Cu-Ni

Reported by Knox A. Powell

Research Engineer, Minneapolis-Moline Power Implement Co.

The so-called low-alloy, high-tensile steels really contain considerable alloy, James W. Halley, chief research engineer of Inland Steel Co., pointed out in a short illustrated talk before the North West Chapter A.S.M. Alloy content may come to around 2%, he said.

The high-tensile steels are not much higher in ultimate strength than plain carbon steels because they must be cold formed on ordinary equipment. However, working strengths are much higher than for plain carbon steel, (around 30,000 p.s.i.), corrosion resistance is four times that of carbon steel (permitting thinner gages), and impact strength is high and well sustained into subzero ranges (where carbon steel is brittle).

Used Without Heat Treatment

Low-alloy, high-tensile steels are low in carbon (10 points with a 12 point maximum), and are not intended for any subsequent heat treatment since they are usually made into bulky fabricated products such as freight cars. The material welds well, with only slight brittleness in spot welds because of the inherent sharp quench. The material formerly cost about 50% more than plain carbon steel, which made its finished costs about the same; however, it is somewhat higher now.

Low-alloy, high-strength steels are of two types, said Mr. Halley—the chromium-silicon alloy and copper-nickel alloy. In the former molybdenum can be substituted for chromium, and in the latter there are two grades—one with copper under 0.5%, and one with copper around 1%. The higher copper steels can be heat treated by precipitation hardening if desired. Incidentally, precipitation hardening in the manufacture of thicker plate offsets the strain hardening in this plate so that physicals are the same from 20 gage to 1½ in. thickness.

Discussion suggested the value of low-alloy composition for precipitation hardened steel castings to replace forgings where impact strength is important, particularly at low temperatures. Suitability of low-alloy sheet for automobile fenders, splash plates, and mufflers, which fail rapidly by corrosive road materials, salt spray and corrosive gases, was also suggested. However, the low-alloy steel does not have the superlative drawing qualities required for motor car fenders.

Announcing the

FOURTH Metallographic Exhibit

to be held at the National Metal Congress and Exposition in Cleveland, Oct. 17 to 21, 1949. Rules are simple and few; there are no restrictions as to size or method of mounting. A large area in the exhibition hall has been reserved so the entries can be displayed to best advantage.

RULES FOR ENTRANTS

Work which has appeared in previous Metallographic Exhibits is unacceptable.

Photographic prints shall be mounted on stiff cardboard, each on a separate mount. Each shall carry a label giving:

Name of metallographer
Classification of entry
Material, etchant, magnification
Any special information as desired

Transparencies or other items to be viewed by transmitted light must be mounted on light-tight boxes wired for plugging into an ordinary lighting circuit, and built so they can be fixed to the wall.

Exhibits must be delivered between Oct. 1 and Oct. 12, 1949, preferably by prepaid express or registered parcel post.

Address: Metallographic Exhibit,
c/o W. H. Eisenman
National Metal Congress and Exposition
Cleveland Public Auditorium, Cleveland, Ohio

CLASSIFICATION OF MICROGRAPHS

1. Cast Irons and Cast Steels
2. Toolsteels (except carbides)
3. Irons and Alloy Steels (excluding stainless) in Wrought Condition
4. Stainless and Heat Resisting Steels and Alloys
5. Light Metals and Alloys
6. Heavy Nonferrous Metals and Alloys
7. Powder Metals (and carbides) and Compacts
8. Weld Structures (including brazed and similar joints)
9. Series of Micros Showing Transitions or Changes During Processing
10. Surface Phenomena and Macrographs of Metallurgical Objects or Operations (2 to 10 diam.)
11. Results by Non-Optical or other Unconventional Techniques.

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a first prize (a blue ribbon) to the best in each classification. Honorable Mentions will also be awarded other photographs which in the opinion of the judges closely approach the winner in excellence.

A Grand Prize, in the form of an engrossed certificate, and a money award of $100 will be awarded the exhibitor whose work is adjudged "best in the show", and his exhibit shall become the property of the American Society for Metals for preservation and display in the Sauveur Room at the Society's Headquarters. All other exhibits will be returned to owners by prepaid express or registered parcel post during the week of Oct. 23, 1949.

Entrants living outside the U. S. A. will do well to send micros by first-class letter mail endorsed "May be opened for Customs inspection before delivery to addressee".

31st NATIONAL METAL CONGRESS

CLEVELAND PUBLIC AUDITORIUM, CLEVELAND

October 17 to 21, 1949

THIRTY YEARS AGO

After a short life as independent organizations, the Steel Treating Research Society and the American Steel Treaters Society merged in 1920 to form the present American Society for Metals. The early issues of the official publications of these two societies (1917-1920) are filled with nostalgic and historical associations.—Ed.

—30—

A note in the August 1918 issue states that the Steel Treating Research Society, having grown from a membership of 39 to over 1200 in less than two years, is no longer a Detroit organization but a national body with officers and executive committee members in Chicago, Cleveland and Syracuse.

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Quote from "Critical Points" department in an early issue: "Much has been said about the crystallization of steel subject to continued vibration. Does steel crystallize under such use? Let us have an opinion from you."

—30—

The Cleveland Section of the Steel Treating Research Society was launched on Nov. 27, 1918.

—30—

Among the "personal items" is a note that M. K. EPSTEIN of Philadelphia had moved his office to 703 Lincoln Building, handling equipment for heat treatment of metals. Mr. Epstein is now president of Dempsey Industrial Furnace Co., Springfield, Mass.

—30—

J. M. WATSON, chief metallurgist for Hupp Motor Car Co. (and later to become a national president of the American Society for Steel Treating), is listed as a member of the executive committee of the Detroit Section of the society.

—30—

C. B. SWANDER, a founder member and past chairman of the St. Louis Chapter, presented a paper at Detroit on "Manufacture of High Explosive Shells and Detonators, From the Metallurgist's Viewpoint", Mr. Swander was, and still is, metallurgist for Wagner Electric Mfg. Co.

—30—

An early realization of the importance of controlled atmospheres and controlled combustion in heat treating is indicated by a description of the "surface combustion" process, presented by JOHN H. BARTLETT, JR.

"Surface combustion," writes Mr. Bartlett, "is not exactly heat treating, but is a method of obtaining the precise conditions of temperature and atmosphere surrounding a piece of work which are desired for careful heat treatment."

—30—

A new chapter of the American Steel Treaters' Society was organized in Pittsburgh on Feb. 24, 1919. B. F. WESTON, metallurgist for Union Drawn Steel Co. was chairman and D. W. MCDOWELL, metallurgist for Jones & Laughlin Steel Corp., was elected secretary-treasurer. W. S. BIDLE, then chairman of the Cleveland Chapter (later a national A.S.M. president and now deceased), addressed the first meeting.

Moves Into New Plant

Technical Metal Processing, Inc., commercial metal joining and induction heat treating plant, has moved into new and larger quarters at East 55th St. and Lake Court, Cleveland 14.

The new plant, built by the company for its specialized needs, has approximately twice the floor space of the previous location and is equipped with additional facilities for controlled atmosphere electric furnace copper brazing, silver brazing, and induction heat treating operations of all types. Aluminum brazing has been added to the list of processes handled previously, and a newly developed method of joining aluminum to steel is also offered.

Research in Steelmaking Chemistry Is Aimed at Increasing Production

Reported by T. Carlson
Isaacson Iron Works

The Puget Sound Chapter A.S.M. was introduced to the newest methods used in steelmaking when J. S. Marsh, research engineer, Bethlehem Steel Co., spoke on "Modern Openhearth and Electric Furnace Steelmaking."

The pressure put on the steelmakers during the war to increase production, he pointed out, has resulted in a research program to find ways and means of increasing capacity. In discussing this research, he treated the chemistry of steelmaking in a most comprehensive manner.

If the principle reaction—namely, that between carbon and oxygen—could be speeded up, output would be automatically increased. The openhearth and electric furnaces are simply heat engines by which the reaction is produced, the speaker said. For each set of conditions there is an equilibrium point. If, in the carbon-oxygen reaction, an oxygen potential or driving force is set up, the equilibrium is disturbed and the higher the potential, the faster the reaction.

In experimental heats oxygen bubbling through the molten metal speeded up the reaction. In production, the increased oxygen potential is supplied by bubbling air rather than oxygen through the metal for reasons of economy.

Until refractories which will stand up under 3500° F. are commercially and economically avaliable, the production of steels by a continuous process will not be practical, the speaker opined.

New Englanders Inspect Norton Plant

Norton Co. played host in May to 75 A.S.M. members, who were attending the New England Regional Meeting at Worcester, Mass. Link Johnson (second from right) of manufacturing control, ceramic, guided one group through the abrasive division. (Reported by C. Weston Russell)

Stainless Steel Memento And Original Micros Given to Sauveur Room

The Sauveur Memorial Museum at A.S.M. headquarters in Cleveland has been enriched by two recent gifts from A.S.M. members.

One is a photograph of Benno Strauss, one of the originators of 18-8 stainless steel, etched on a piece of his original stainless steel. Donor is Marcus A. Grossmann, director of research for Carnegie-Illinois Steel Corp., and a past president of the society.

The photograph was presented to Dr. Grossmann by Dr. Strauss 20 years ago when the former was in Germany. Two such stainless steel pictures had been made for Dr. Strauss by an Austrian inventor named Schafer, who "signed" the picture by scratching his name in the corner, where it may still be seen. Since Strauss is now dead and his laboratory and his own copy of the picture doubtless gone, the one being given to the A.S.M. is probably the only such specimen in existence.

The second gift consists of three framed mounts of austenite and martensite, donated to the A.S.M. by the famed microscopist Francis F. Lucas, who is retiring on Sept. 1 from Bell Telephone Laboratories.

The micrographs were made to illustrate a paper presented by Mr. Lucas at the A.S.M. annual convention 25 years ago—a paper which later won him the Howe Medal. The mounts are 30x40 in. each, and have been hanging on the walls of his laboratory during the intervening time.

The stainless steel etching of Dr. Strauss is approximately 3x4 in. and is mounted in a walnut frame about 7x8 in. All of the gifts will be prominently displayed on the walls of the A.S.M. Sauveur Room.

Compliments

To CLYDE WILLIAMS, director of Battelle Memorial Institute, on the receipt of an honorary degree of Doctor of Engineering from Michigan College of Mining and Technology.

♦ ♦ ♦

To ADOLPH O. SCHAEFER, assistant to the executive vice-president of the Midvale Co., on his appointment to the Research Committee of the Franklin Institute.

♦ ♦ ♦

To MATTHEW A. HUNTER, who is retiring as dean of faculty after 40 years of service at Rensselaer Polytechnic Institute, where he has headed various departments, including the metallurgical engineering department.

♦ ♦ ♦

To ROBERT F. MEHL, director of the metals research laboratory and head of the metallurgical engineering department at Carnegie Institute of Technology, on his recent trip to Brazil as a guest at the 50th anniversary of the Research Institute of the State of Sao Paulo. Dr. Mehl also attended the fifth anniversary of the Brazilian Society of Metals, which he helped organize.

♦ ♦ ♦

To F. H. SPEDDING, director of the Iowa State College Institute for Atomic Research, and director of the Ames Laboratory of the Atomic Energy Commission on receipt of an honorary degree of Doctor of Science from University of Michigan.

♦ ♦ ♦

To HARLEY A. WILHELM, assistant director of the Iowa State College Institute for Atomic Research, on receipt of an Alumni Merit Award from the Iowa State College Club of Chicago.

♦ ♦ ♦

To W. J. LONG, formerly manager of toolsteel sales, and to WILLIAM G. STEWART, formerly assistant secretary, on their election as vice-presidents of Universal-Cyclops Steel Corp.

♦ ♦ ♦

To W. A. WESLEY, W. W. SELLERS, and E. J. ROEHL, on the award of the Founders Gold Medal for 1949 by the American Electroplaters' Society. The medal is awarded annually for the best paper delivered at the convention.

♦ ♦ ♦

To F. O. COOPER, Chicago district senior service metallurgist for Carnegie-Illinois Steel Corp., on the dinner given in his honor following his retirement on May 31.

The Reviewing Stand

THE "ECONOMY-IN-PRODUCTION" theme is turning out to be a natural for this year's Metal Congress. Exhibitors in the Metal Show are enthusiastic in their plans to demonstrate concrete examples of money-saving techniques. Also our advance-interest scouts report a distinct pricking up of the ears and licking of chops on the part of those planning to attend. With such nourishing fare offered to them as the "Economy-in-Production" round-table discussions, the "Economy Theaters", and the exhibitors' visible demonstrations of cost-cutting methods, no-one who attends the Show should come away without picking up some hint or idea that will cut down waste in his own operations.

A.S.M. members are being given an opportunity to capitalize on this economy theme to the tune of a top prize of $300 for a good idea. As we go to press, only a few days remain to get in your own story. See page 27 for the conditions of the contest and a few simple rules. And don't forget that your idea may help someone else—a snowballing that should stimulate the nation's slightly faltering economy. . .

We reprint with no comment the concluding paragraphs from a review of the 1948 Metals Handbook, from the Italian magazine, *Alluminio*:

"We congratulate the highly deserving American Society for Metals for the excellent work they have achieved—a work that once again proves the organizational efficiency of the Society, the seriousness of its purpose, and the size of the financial means at its disposal. By contrast, we cannot suppress a sense of bitterness when we consider how cumbersome, disjointed and difficult is the functioning of the all-too-many metallurgical associations in Europe, in which continue to exist useless divisions by language, by country and even by cities, and jealous divisions of sectors and specializations. Thus, for instance, European ferrous metallurgy is separated from the metallurgy of nonferrous metals, and a wide breach exists between Italian metallurgists and their close neighbors, the Belgians, the French, the British and the Germans.

"This leads to an inherent dispersion of the financial and intellectual forces into hundreds of brooks and rivulets; a dispersal of forces which will never permit us—no matter how capable we may be—to achieve a unity, a true metallurgical and metallographic body such as the one that exists in an America which is free, coordinated and cooperative."

M.R.H.

Technical Talks on Forging and Stamping Feature Regional Meeting

Reported by John O. Morton
Austin Hastings Co., Inc.

The New England Regional Meeting of six A.S.M. chapters was marked by a day's program of plant visits and technical talks, and was climaxed by a dinner program at which Bennett Cerf, humorist, publisher and author, shared speaking honors with A.S.M. National President H. K. Work.

The meeting was held in Worcester, Mass., on May 13. Participating chapters were Worcester, New Haven, Boston, Springfield, Hartford, and Rhode Island.

Speakers at the afternoon technical session were George W. Motherwell, works manager, Wyman-Gordon Co.; J. Walter Gulliksen, superintendent, Worcester Pressed Steel Co.; and John H. Hull, metallurgist, Wyman-Gordon Products Corp.

Bennett A. Cerf (Left) and A.S.M. President Harold K. Work (Center) Shared Speaking Honors During the New England Regional Meeting at Worcester. At right is Leo P. Tarasov, Chairman of the Worcester Chapter

Speaking on "The Romance of Forging", Mr. Motherwell traced the art from 55 B.C., when forging was used for war implements such as swords and armor. Harry Bessemer's "new" steelmaking process in 1856 was of great assistance in the development of the present-day forging industry, he said.

Stating that the first steam hammer was developed in 1838, the speaker described the open-die, drop, upset and press forging techniques. Advantages of forging as compared to other methods of working are better grain flow, accuracy, greater strength, and low-cost assembly.

The forging industry's contribution to the aircraft industry has been tremendous. A total of 1050 Wyman-Gordon forgings, of aluminum, magnesium and steel, have been incorporated in the B-36 bomber.

Slides were shown illustrating successive advances in forging over the years.

Mr. Gulliksen then presented a brief history of the stamping art, explaining the processes of stamping, deep drawing and coining of such materials as steel, stainless steel, aluminum and brass.

Deep drawing of metals was first tried in 1868 by J. H. Cole. The speaker explained this process as a method of persuading the metal to take the desired shape. The coining process, he said, is a squeezing or pressing of metals to size.

Interesting examples of modern stamped products—both deep drawn and coined parts—were exhibited and described by Mr. Gulliksen.

Mr. Hull, the final speaker, discussed "Large Magnesium and Aluminum Forgings". His talk covered some of the metallurgical and materials handling problems involved in producing light metal forgings on the 18,000-ton press at the Wyman-Gordon Products Corp.

To produce aluminum or magnesium forgings, the material is heated and forced into shape under pressure, either under a hammer or on a press. Forgings from 20 to 500 lb. are produced at the North Grafton plant, where the 18,000-ton press is located. Various samples of parts produced on it were displayed and described.

Earlier in the day, members and guests visited the plants of Norton Co., Wyman-Gordon Co., Worcester Pressed Steel Co. and Wyman-Gordon Products Corp., as well as the John Woodman Higgins Armory. A program of entertainment for the ladies was also arranged.

WELDING & BRAZING (Concluded from page 7)

the relation of design to structural behavior (22b-82 and 22b-87, April 1948; 22a-161, Aug. 1948; 22b-272 and 22b-279, Nov. 1948; 22b-321, Dec. 1948), and the behavior of small specimens and the relation of this behavior to that of large structures (22b-169 and 22b-170, July 1948; 22b-223, Aug. 1948; 22b-284, Nov. 1948) have been studied. The results of this work indicate two things. First, small specimens can only be used for qualitative testing. For example, they may rate a number of different steels in the order in which they will perform in a structure, but they will not give quantitative information concerning that performance. Second, design exerts a great and perhaps controlling influence on the behavior of a structure. For example, in tests of simulated full-scale ship hatch corners, it was found that the design was the major factor in the test behavior of the structure rather than the welding procedure or the base material used.

Miscellaneous

Haworth (22b-308, Nov. 1948) studied the relative resistance to sliding abrasion of arc welded and gas welded hard facings. In general, gas welded deposits are more resistant than arc welded deposits, and the resistance of the arc welded deposits can be raised by increasing the thickness of the deposit (1/8 or 3/16 in. thick for homongeneous hard facing materials).

Ceramic backups may be used for groove joints, but commercial refractories (such as firebrick) are not satisfactory (22b-356, Jan. 1949). Fused mullite, or PB sillimanite (both $3\ Al_2O_3 \cdot SiO_2$), and tabular alumina give much better results. The best coating for copper backups is essentially wollastonite ($CaO \cdot SiO_2$).

Another welding sidelight is the spraying of metallic elements, alloys, rubber, and plastic materials using a gas flame (7a-37, March 1948). Powdered materials are carried into the flame by an auxiliary gas. The process can be used for coating steels and other materials by manual or automatic means.

Purdue Symposium on Machinability Attracts Over 200

Reported by H. C. Dameron, Jr.
Aluminum Co. of America

Over 200 members and guests attended the symposium on machinability held at Purdue University on April 23 and sponsored by the Purdue Chapter A.S.M. Other Indiana groups that participated were the Calumet, Fort Wayne, Indianapolis, Muncie, Notre Dame and Terre Haute Chapters. A. E. Focke of Diamond Chain Co., Indianapolis, and A.S.M. national vice-president, acted as technical chairman of the symposium.

After registration, those in attendance were escorted through the new machine tool laboratory in the Michael Golden Shops of the university. There they had an opportunity to see the new arrangement of over 1½ million dollars' worth of machine tools for student instruction, machinability tests and investigations in production machining problems. The trip also included a visit through the new Naval gage laboratory, which is equipped with the most modern types of gaging equipment.

The first technical paper was presented by Eugene Merchant, senior research physicist of the Cincinnati Milling Machine Co., on "Theory of Machining". Dr. Merchant described the three types of chips—segmental, simple continuous, and continuous with built-up edge—and showed how chip formation is affected by shear angle. An excellent movie, which included many shots through a microscope, showed the mechanism of chip formation and the action of the cutting fluid in reducing the coefficient of friction between the chip and the tool face.

In the discussion of this paper several points were elaborated, but it seemed particularly significant that while Dr. Merchant has made great strides in developing a rational explanation for observed tool cutting action, and these principles can be used to establish preliminary conditions on production machining, the final arrangements can only be established after actual production runs.

In the second paper Francis W. Boulger, supervising metallurgist, Battelle Memorial Institute, talked on "Recent Researches on Machinability". This talk was largely developed around a description of a "fixed pressure lathe test" developed at Battelle in an effort to measure variations in steel of the same nominal composition in a minimum time. They found that even with their laboratory controlled conditions and with all tests run in sextuplicate, differences of less than 5% were not significant.

Good correlation was obtained between the machinability index resulting from their tests and the results of tool life tests. Also, in most attempts they obtain satisfactory correlations with commercial ratings. However, no direct correlation was found with hardness, and extreme caution was necessary when attempting to apply the results of these tests in service.

A large part of the discussion of this paper was devoted to the effect of cold drawing on machinability, and Dr. Merchant and Mr. Boulger agreed that while some machinability tests show little advantage for cold drawn stock, there are many practical reasons why cold drawn material is advantageous in production.

In the final paper A. W. Lindert, group leader, lubricants formulation group of the Standard Oil Co. of Indiana, talked on "Soluble Cutting and Grinding Oils and Their Application to Machining Operations", and described a new development in cutting oils for grinding. By coating each chip with a water-repelling compound, the new oil insures that the steel chips will settle completely.

This symposium was an excellent example of how the American Society for Metals functions as an educational institution, but it is obvious that much remains to be done to bridge the gap between the theoretical and phenomenological knowledge in the field of machinability.

Metals Review's Honor Roll of the Well Informed

Correct Answers to the Quiz Questions Published on Page 4 of the June Issue of Metals Review Were Received From the Following Readers

A. H. Albertson, Jr., field engineer, Leeds & Northrup Co.; John Alico, consulting engineer; William R. Angell, laboratory head, U. S. Navy Metals Lab.

M. F. Behar, editor, Instruments Publishing Co.; Dale Bittinger, asst. supt., Sheet Mill, Jessop Steel Co.; Edward T. Bonn, chemist, American Standard Corp.; Carl F. Brass, Jr., student, University of Pittsburgh; W. W. Brenneman, Lima-Hamilton Corp.; G. Frederick Bush.

Hallock C. Campbell, assoc. director of research and engineering, Arcos Corp.; Ralph R. Casper, heat treater, Eastman Kodak; Keith Charters, salesman, Harrington Tool & Die Co.; Joseph W. Conway, metallurgist, Crucible Steel Co. of America; E. B. Covington, foreman (Machine Shop), Atlantic Steel Co.

Paul Erik Dillberg, production engineer, E. Horton & Son; Ervin A. Domzal, metallurgical department, Hoover Ball & Bearing Co.; R. Doughton, Jr., lieutenant commander, U. S. Navy.

B. F. Eddie, tool engineer.

Avery H. Fisher, asst. metallurgist, Babcock & Wilcox Co.; Edward K. Fisher, metallurgical department, Carpenter Steel Co.; James L. Foster, metallurgist, Wheel and Brake Div., Goodyear Aircraft Corp.

Louis E. Gilbert, inspector, Camden Forge Company; Frederick Gonton, tool and die hardener, Hodges Tool & Mfg. Co.; Russell K. Grant, heat treater, General American Transportation Co.

Alfred C. Harris, metallurgist, Kraeuter & Co., Inc.; Karl E. Hein, O. T. Muehlemeyer Heat Treating Co.; Charles A. Higgerson, instructor, N. Y. State Technical Institute; Webster Hodge, asst. supervisor, Nonferrous Div.; Battelle Memorial Institute; C. C. Hoffman, metallurgist, Timken Roller Bearing Co.; P. S. Hoffman, metallurgist, Treadwell Engineering Co.; J. Honest, Machine Shop, University of California.

H. Richard Irwin, metallurgical engineer, Babcock & Wilcox Tube Co.

Ralph S. Johnson, superintendent, O. T. Muehlemeyer Heat Treating Co.

David L. Kistler, vacuum melting metallurgist, Beryllium Corporation; Raymond B. Koehler, materials engineer, Army Ordnance; Alfred S. Kos, chief engineer, Globe Stamping Div., Hupp Corp.

R. H. Lambert, commander, Navy Department, Bureau of Ships; Paul L. Landgraf, student, Case Institute of Technology; Mike Lauriente, lieutenant (jg), U. S. Navy; James A. Leahy, consultant; John C. Lehmann, heat treat tool expert and tool straightener, Kaiser-Frazer; John J. Linnehan, service engineer, Linde Air Products; Robert St. Clair Low, powder metallurgist.

Gordon B. Mannweiler, research engineer, Eastern Malleable Iron Co.; Earl Margitan, metallurgical engineer, Ford Motor Co.; Henry Mayer, chief chemist, Perfex Corporation; John J. McCarthy, instructor, Rensselaer Polytechnic Institute; John K. McIver, metallurgist, Commercial Controls Corp.; P. Edward McKenna, manager, Stainless Steel Dept., United States Steel Supply Co.; A. H. McMahan, sub foreman, Hughes Tool Co.; Rex W. McMillan, research metallurgist, National Cash Register Co.; Paul Steven Methe, research metallurgist, National Lead Co.; Donald K. Miller, heat treat foreman, Weirton Steel Co.; Frank W. Miller, asst. plant engineer, Detroit Steel Products Co.; J. D. Morris, equipment inspector, Logo Oil & Transport Co., Ltd.; Carl H. Mull, toolmaker, Gleason Works.

E. L. Novomesky, metallurgist, Wright Aeronautical Corp.

Alfred Pasler, heat-treater, Alfred Hoffmann & Co.; James R. Patterson, asst. superintendent, Cook Heat Treating Corp.; David W. Pettigrew, Jr., research engineer, Aluminum Research Labs.; Leslie B. Piper, metallurgist, Rolling Mills, Edgar Thomson Works, Carnegie Illinois Steel Corp.; G. W. Place, surveyor, American Bureau of Shipping; Norbert Polakowski, metallurgical superintendent, U. S. Reduction Co.; Lew F. Porter, research metallurgist, University of Wisconsin.

Lewis B. Reed, Industrial heating engineer, Department of Water and Power, City of Los Angeles; Ralph G. Reeve, Joseph T. Ryerson and Son, Inc.; Leon F. Ross, metallurgical engineer trainee, Mesta Machine Co.

Richard D. Schoch, salesman, Ladish Co.; D. A. Scott, metallurgist, International Nickel Co. of Canada; Arthur M. Shrager, teacher, Brooklyn Technical High School; G. H. Silver, metallurgist, Monarch Machine Tool Co.; Harry F. Simmons, heat treat foreman, Sylvania Electric Products; A. P. Simpson, owner, Simpson Motor; Charles L. Smith, metallurgist, The Miller Co.; Rebecca H. Smith, chief metallurgist, Turbodyne Corp.; Andrew R. Spencer, sales engineer, Steel Sales Corp.; Lester F. Spencer, chief metallurgist, Landers Frary & Clark; Henry T. Stedman, general annealing foreman, Revere Copper & Brass Inc.

E. S. Taylor, sales engineer, Pacific Steel Casting Co.; Raymond J. Thomas, chief metallurgist, Jacob Aircraft Engine Co.; R. C. A. Thurston, metallurgical engineer, Bureau of Mines, Canada.

Greswold Van Dyke, metallurgist, H. & B. American Machine Co.; Forest F. Versaw, shop superintendent, Gulf Research & Development Co.

L. E. Wagner, engineer of utilization, Providence Gas Co.; Wm. Y. Webb, industrial engineer, Navy Dept.; Walter H. Weinwurm, chief metallurgist, Union Special Machine Co.; C. W. Werth, metallographer, Atlantic Steel Co.; Lewis L. Wilmot, quality engineer, Chevrolet-Flint Mfg. Div.; Paul M. Winslow, metallurgist, Solar Aircraft Co.

Peter E. Young, research chemical engineer, Briggs Manufacturing Co.

Describes Use of Salt Baths For Interrupted Quench

Reported by Ralph S. Johnson

O. T. Muehlemeyer Heat Treating Co.

Use of salt for heating for quenching, tempering and carburizing was described before a recent meeting of the Rockford Chapter A.S.M. by James J. McElgin, manager of the metal working department of E. F. Houghton & Co. The title of his talk was "Practical Applications of Interrupted Quenching".

By using agitators and pumps in the salt quench on some production jobs, he said, very good hardnesses have been obtained with a minimum of distortion. Martempering, however, can be done somewhat cheaper when a high-temperature quenching oil is used.

A coffee talk was presented by W. Robert Smith, professor of philosopy, Dubuque University.

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Five Students Win Memberships

Five top-ranking students in a course on "The Fundamentals of Heat Treating" were presented with memberships in the American Society for Metals at the May meeting of the St. Louis Chapter. The course was given at the David Ranken Jr. School of Mechanical Trades. In the photograph (left to right) are William Hammer, instructor (in charge of the heat treating shop of the Lindberg Steel Treating Co. of St. Louis); Students E. A. Cunliff, W. E. Eikmeier, J. A. Berger, and F. L. Bent; and George B. Rodenheiser, assistant director of the David Ranken Jr. School of Mechanical Trades. P. F. Meek, fifth recipient of the awards, was not present at the meeting. (Reported by H. O. Nordquist)

Low-Carbon Stainless Solves Problem Of Carbide Precipitation—Krivobok

Reported by W. P. Wallace
University of California

"Stainless Steel has come of age" was the opening remark of V. N. Krivobok, metallurgist for International Nickel Co., Inc., in his address before the Los Angeles Chapter A.S.M. on May 12. To prove this point, Dr. Krivobok stated that in 1948 the United States produced 652,000 tons of stainless steels, whereas its production in 1939 was 179,620 tons, and in 1940 249,980 tons.

This large demand, according to the speaker, is due to the following characteristics of stainless steels: (a) high mechanical properties; (b) corrosion resistance; (c) formability; (d) maintenance of high mechanical properties under fairly high temperatures.

One steel may not possess all of the above qualities under all service conditions, Dr. Krivobok pointed out. It is necessary to choose that steel which has the best combination of these properties under existing conditions. A specific service condition is that in which carbide precipitation would be a problem. The development of very low carbon stainless steels was a far reaching contribution to the solution of this problem.

Formerly, the damaging effects of carbide precipitation were avoided by the addition of columbium or titanium to the stainless composition. Columbium, most widely used for this purpose, is a strategic element. Therefore, if the source for columbium were cut off, low-carbon stainless steels could be used for those applications where carbide precipitation is a problem.

The "stability" of austenitic stainless steels is reflected in their mechanical properties. Greater stability can be induced by alloying stainless steels with substantial amounts of nickel, nitrogen and manganese. An increase in nickel over the standard 8% beneficially affects forming properties, but lowers the rate of work hardening. Manganese in substantial amounts (over 4%) adversely affects corrosion resistance. Nitrogen, like manganese, diminishes corrosion qualities, and if present in substantial amounts (0.3% or so) it renders the impact strength at subzero temperatures relatively low. Dr. Krivobok cited some data indicating that subzero impact strength may be as low as 17 ft-lb.

The strengthening of stainless steels by cold work is believed to result from the decomposition of austenite to ferrite and a fine dispersion of carbides, similar to that found in martensite. Dr. Krivobok briefly mentioned recent investigations on rolling of stainless steels under controlled temperature conditions. Original data obtained in his laboratory show very interesting properties of cold rolled stainless steels at subzero temperatures—namely, both strength and ductility are higher than at room temperature. This observation is now utilized in certain forming processes.

Frank B. Bolte served as technical chairman of the meeting, and new officers for the 1949-50 season were elected, as shown on page 20.

V. N. Krivobok (Center) Makes a Point About Stainless Steels to E. R. Babylon, Retiring Chairman of the Los Angeles Chapter. At left is W. J. Parsons, secretary-treasurer of the chapter

Abrasion Resistant Alloys Require Combination of Hardness and Toughness

Reported by Robert T. Hook
Assistant Metallurgist, Warner & Swasey Co.

How "Abrasion Resistant Alloys" should be selected for longest life was explained by Howard S. Avery of the American Brake Shoe Co. at the last technical meeting of the year for the Cleveland Chapter A.S.M. The speaker defined abrasion as a type of wear associated with scratching by hard particles and complicated by various stress concentrations. He differentiated it from erosion (which is associated with velocity effects) and frictional wear between metals.

Abrasion resistance may be partially estimated from hardness data but quantitative evaluation of required toughness, though difficult, is also necessary. The useful abrasion resistant alloys are those which provide a graded scale of hardness, toughness, and associated properties.

The useful metals include hard compounds like tungsten carbides and chromium carbides, composites such as cemented carbides, carbide welds, and cast iron structures with primary carbides, aggregates such as pearlite, bainite, and martensite steels, and solid solutions typified by austenitic and chromium-cobalt-tungsten alloys. When abrasion is associated with heat, corrosion, vibration, or other factors, additional chemical and physical properties become very important.

An industrially proven list of alloys ranging from extreme hardness to extreme toughness in order includes tungsten carbide (hardest), HC-250 (26% Cr) iron, martensitic iron, Cr-Co-W alloys, martensitic steels, pearlitic steels, and austenitic manganese steels (toughest). To rank these alloys properly for selection purposes requires both laboratory and field tests in adequate variety and is a domain of continuing research.

The effects of different abrasives, such as dolomite, feldspar, quartz sand, and flint, and the influence of stress and particle size were demonstrated by data from a validated abrasion testing apparatus.

Bryant Heater Purchased

The assets and business of the Bryant Heater Co. have been purchased from Dresser Industries by Affiliated Gas Equipment, Inc. The manufacture and sale of all former Bryant Heater Products, using the same trade names, will be continued with no change in personnel.

The former Bryant Heater Co. Industrial Division is now designated as Bryant Industrial Division, Affiliated Gas Equipment, Inc., 1020 London Rd., Cleveland 10, Ohio.

IMPORTANT MEETINGS
For September

Sept. 9-12—Instrument Society of America. Clinic on Maintenance of Industrial Instruments, Hotel Statler, St. Louis, Mo. (I.S.A. 921 Ridge Ave., Pittsburgh 12.)

Sept. 12-16—Instrument Society of America. Fourth National Instrument Conference and Exhibit, St. Louis Auditorium, St. Louis, Mo. (I.S.A., 921 Ridge Ave., Pittsburgh 12.)

Sept. 10-14—American Society for Testing Materials. West Coast Meeting, Fairmont Hotel, San Francisco. (R. J. Painter, A.S.T.M., 1916 Race St., Philadelphia 3.)

Sept. 13—Society for Applied Spectroscopy. September Meeting, Socony-Vacuum Training Center, 63 Park Row, New York. (Roger W. Loofbourow, Merck & Co., Inc., Control Division, Rahway, N. J.)

Sept. 17-20—American Gas Association. Annual Convention, Chicago. (M. A. Combs, secretary, A.G.A., 420 Lexington Ave., New York 17.)

Sept. 21-24—National Association of Foremen. 26th Annual Convention, Statler Hotel and Masonic Temple, Detroit. (B. A. Hodapp, president, N.A.F., 321 West First St., Dayton 2, Ohio.)

Sept. 25-Oct. 1—American Institute of Mining and Metallurgical Engineers. Midyear Meeting, Orton Hall, Ohio State University, Columbus, Ohio. (Hugo Johnson, general chairman of meeting, Battelle Memorial Institute, Columbus 1, Ohio.)

Sept. 28-30—American Society of Mechanical Engineers. Fall Meeting, Erie, Pa., (Ernest Hartford, executive assistant secretary, A.S.-M.E., 29 West 39th St., New York 18.)

Sept. 29—American Iron and Steel Institute. Regional Technical Meeting, Statler Hotel, Buffalo, N. Y. (George S. Rose, secretary, A.I.S.I., 350 Fifth Ave., New York 1.)

Sept. 29-Oct. 1—Magnesium Association. Midyear Meeting, Greenbrier Hotel, White Sulphur Springs, West Va. (Magnesium Association, 30 Rockefeller Plaza, New York 20.)

Sturgis Takes Roto-Finish Name

Sturgis Products Co., Sturgis, Mich., producer of Roto-Finish materials, equipment and processes for mechanical finishing, has changed its corporate name to the Roto-Finish Co., and moved all sales and manufacturing to its new plant in Kalamazoo, Mich. This change affects the firm name only. Organization and company structure remain the same.

Wins New Golf Trophy at Ontario

D. O. Davis (Center), Chairman of Ontario Chapter's Field Day, and J. W. Watson of the Executive Committee, Present the Golf Trophy and Replica to W. Court, Winner of the Tournament With a Score of 76

Reported by B. Dixon
Assistant Sales Manager
Dominion Wheel & Foundries Limited

The annual Field Day of the Ontario Chapter A.S.M. was held at the Glendale Golf Club in Hamilton on June 10. The feature event was the competition for the new golf trophy established by this year's Executive Committee.

Spirited contests also went on in dart throwing and horseshoe pitching. Over 75 lucky number prizes were distributed through the generosity of sustaining member firms and associated companies.

Clam Bake Ends Season

Reported by L. H. Decker
Revere Copper and Brass, Inc.

The second annual clam bake of the Rome Chapter A.S.M. was held at Beck's Grove on June 9. Prizes were offered to winners of several sports events, as well as to the holder of the "lucky ticket".

Over 50 members and guests attended this affair, which terminates the meetings of the Rome Chapter until the regular monthly technical meetings are resumed in September.

Awarded First Metzger Scholarship

The First George L. Metzger Scholarship of the Philadelphia Chapter A.S.M. Was Awarded to Warren C. Spatz, Jr. of Upper Darby High School. Carrying a $150 stipend, the scholarship was awarded for the best paper on "Why I Have Chosen Metallurgy as My Future Career". Left to right are Charles A. Turner, Jr., chairman of the Educational Committee; Mr. Spatz; and Edgar K. Spring, chapter chairman-elect. Mr. Spatz will attend Lehigh University. (Reported by Howard J. Godfrey, John A. Roebling's Sons Co.)

ROSTER OF ASM CHAPTER OFFICERS

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Treasurer—Robert E. Harvie, 33 Parkhurst Blvd., Kenmore 17, N. Y.

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J. M. Goldsmith (Left), Chief Inspector, Sheffield Steel Corp., Is the New Chairman of the Kansas City Chapter, Succeeding Henry C. Deterding, (Right), Chief Metallurgist, Sonken & Galamba Corp. Election results were announced at the May meeting, when technical activities were dispensed in favor of a social evening. The party was held at the Missouri Yacht Club at Lake Lotawana. About 100 members and guests attended for dinner, dancing and entertainment. (Reported by C. G. Atchinson, Sheffield Steel Corp.)

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Secretary-Treasurer—Lillian K. Polzin, Minneapolis Chamber of Commerce, Hennepin Ave. at Groveland Terrace, Minneapolis 5, Minn.

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Vice-Chairman—Walter H. Clemons, American Brake Shoe Co., National Bearing Div., P. O. Box 458, Meadville, Pa.
Secretary-Treasurer — H. A. McMahon, 216 N. Monroe, Titusville, Pa.

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Secretary—A. L. MacKay, 20 Princeton Rd., Toronto, Ont., Canada
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Chairman—Frederick R. Lorenz, Jr., 428 West Nittany Ave., State College, Pa.
Vice-Chairman—Jerome E. Baird, P. O. Box 1, Bellefonte, Pa.

Left: James B. Morey, Incoming Chairman of the Los Angeles Chapter, Shakes Hands With E. R. Babylon, Retiring Chairman

Secretary-Treasurer—D. F. McFarland, 121 N. Atherton St., State College, Pa.
Recording Secretary—Philip C. Barr, R. D. No. 3, Bellefonte, Pa.

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Vice-Chairman—Joseph Gray Jackson, 112 South 16th St., Philadelphia, Pa.
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Vice-Chairman—A. B. Wilder, The National Tube Co., Frick Bldg., Pittsburgh, Pa.
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Vice-Chairman—C. R. Jackson, E. F. Houghton & Co., 203 White-Henry Bldg., Seattle 1, Wash.
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Vice-Chairman—Fred C. Kroft, Jr., Haynes Stellite Co., Kokomo, Ind.
Secretary - Treasurer — Harold M. Graves, 2019 North 16th St., Lafayette, Ind.

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Vice-Chairman — Wm. J. Loeffler, R. F. D. No. 1, Franklin, Mass.
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Vice-Chairman—Justus Larson, Eastman Kodak, Camera Works, Rochester 4, N. Y.
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Vice-Chairman—Arthur Eklund, Jr., Eklund Metal Treating, Inc., 311 Blackhawk Bldg., Rockford, Ill.
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Vice-Chairman — James Colasanti, Metal Treating and Research Co., Denver, Colo.
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Secretary-Treasurer—Paul J. Hinds, A.T.O. House, Golden, Colo.

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Vice-Chairman—Walter Munn, 2111 Elizabeth St., Pueblo, Colo.
Secretary-Treasurer—Charles C. Tappero, 105 Kenwood Drive, Pueblo, Colo.

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Vice-Chairman—Robert C. Graham, 700 N. Washington St., Rome, N.Y.
Secretary-Treasurer—Arthur G. Putnam, 716 Cherry St., Rome, N. Y.

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Vice-Chairman—Norton Nichols, 118 No. Charles, Saginaw, Mich.
Secretary-Treasurer — Frank A. Simons, 2914 Manor Drive, Midland, Mich.

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Vice-Chairman — Donald L. Clupper, Ingersoll-Rand, Athens, Pa.
Secretary-Treasurer—James S. Meyer, International Business Machines Corp., Endicott, N. Y.

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Vice-Chairman—W. Stanley Beecher, 32 Fenwick St., Springfield, Mass.
Secretary-Treasurer—Robert S. Burpo, Jr. 40 Kendrick Pl., Amherst, Mass.
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Vice-Chairman—Ed. Tetzel, 311 Ohio St., Terre Haute, Ind.
Secretary—M. E. Hansell, Rose Polytechnic Institute, Terre Haute, Ind.
Treasurer—Arthur H. Luehring, 2215 South 8th St., Terre Haute, Ind.

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Vice-Chairman—Harold W. Schmid, General Metals Corp., Box 198, Houston, Tex.
Secretary-Treasurer — M. W. Phair, Tennessee Coal Iron & R. R. Co., P. O. Box 159, Houston 1, Tex.

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Secretary - Treasurer — Wendell K. Hunt, 609 27th St., Bettendorf, Iowa

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Vice-Chairman—Ralph A. Trentham, 810 No. Columbia Place, Tulsa, Okla.
Secretary-Treasurer—J. H. Garrison, 2538 N. Boston Place, Tulsa 6, Okla.

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Vice-Chairman—A. P. Hoelscher, 325 Princeton Circle, American Fork, Utah
Secretary-Treasurer—H. E. Flanders, Metallurgical Dept., University of Utah, Salt Lake City, Utah

VIRGINIA POLYTECHNIC INSTITUTE

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Vice-Chairman—Howard E. Ohl, Box 478, Mineral Ridge, Ohio
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Vice-Chairman — Oscar T. Marzke, Naval Research Lab., Division of Physical Metallurgy, Washington 20, D. C.
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Chairman — E. R. Good, Good Steel Service, Inc., Grand Rapids, Mich.

WESTERN ONTARIO CHAPTER

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Vice-Chairman—Thomas J. Carson, 185 Tecumseh Ave., London, Ont., Canada
Secretary-Treasurer — Raymond E. Barton, Canadian Mines Equipment, Ltd., 596 Hamilton Rd., London, Ont., Canada

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Vice-Chairman—E. A. Bussard, 1718 Garland, Wichita 3, Kan.
Secretary—R. E. Samuelson, 4134 E. Kellogg, Wichita, Kansas
Treasurer—Roscoe D. Howard, 960 Woodrow St., Wichita, Kan.

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Vice-Chairman—Robert S. Morrow, Geo. F. Blake, Inc., 198 Mechanic St., Worcester 8, Mass.
Secretary-Treasurer — Lincoln G. Shaw, 16 Osceola Ave., Worcester, Mass.

YORK CHAPTER

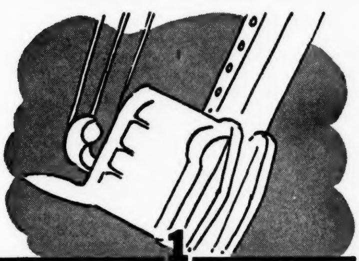
Chairman—Glenn Frank, R. D. No. 1, Camp Hill, Pa.
Vice-Chairman—Henry J. Yeager, P. O. Box 155, Lancaster, Pa.
Secretary-Treasurer—Roy E. Livingstone, 1717 Stanton St., York, Pa.

New Officers of the Rome Chapter A.S.M. Were Elected at the Annual Meeting. Left to right are R. C. Graham, product engineer, Rome Cable Corp., vice-chairman-elect; W. R. G. Baker, vice-president of General Electric Co., who gave a nontechnical talk on television; W. E. Moulton, chief metallurgist, Oneida Ltd., chairman-elect; and L. H. Decker, research associate, Revere Copper and Brass, Inc., retiring chapter chairman

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
Ralph H. Hopp, Librarian — *W. W. Howell, Technical Abstractor*



1 ORE BENEFICIATION and RESERVES

1A—General

1A-37. Jaw Crusher Capacities (Blake Type). D. H. Gieskieng. *Mining Engineering,* v. 1, sec. 3, July 1949 *(Mining Transactions,* v. 184), p. 239-246.

Tests made to check previously reported capacities; to study effects of various factors upon capacity, including jaw plate curvature; and to derive a general capacity equation. Such an equation, derived from results of these tests, is given with factors for its use.

1A-38. Pretreatment of Mineral Surfaces for Froth Flotation. S. A. Falconer. *Mining Engineering,* v. 1, sec. 3, July 1949 *(Mining Transactions,* v. 184), p. 247-255.

Treatment of ground mineral pulp before it enters the flotation machines. Such pretreatment changes the flotation characteristics of mineral surfaces to respond as desired to flotation. Physical methods, chemical methods, and a combination of the two are employed. 26 ref.

1A-39. Finsiktningsundersökningar. (Fine-Screening Investigations.) III. Bengt Fagerberg and Sture Mörtsell. *Jernkontorets Annaler,* v. 133, no. 4, 1949, p. 125-152.

Comparative investigation of drums and Traylor screens in screening magnetite concentrates on cloth with 0.15-0.40-mm. mesh openings. The tests also comprised a study of the influence of the dilution of the material, the number of revolutions, design of the drum, and inherent properties of the material to be screened.

1B—Ferrous

1B-50. Investigation of the Waukon Iron Deposit, Allamakee County, Iowa. Paul E. Pesonen. *U. S. Bureau of Mines,* Report of Investigations 4479, June 1949, 22 pages.

Average grade of ore was indicated to be 37.02% Fe and 27.78% SiO_2 on a dry basis. Beneficiation tests indicated that the percentage of recovery might be relatively low. Results of gravity-concentration and magnetic concentration tests.

1B-51. Iron Ore Beneficiation. Francis X. Tartaron. *Journal of Metals,* v. 1, sec. 1, July 1949, p. 10-14.

Previously abstracted from *Mining Engineering.* See item 1B-36, 1949.

1B-52. Sintering Characteristics of Minus Sixty-Five and Twenty Mesh Magnetite. Alan Stanley and Joseph C. Mead. *Journal of Metals,* v. 1, sec. 3, July 1949, *(Metals Transactions,* v. 185), p. 435-440.

Previously abstracted from *Mining Engineering.* See item 1B-47, 1949.

1C—Nonferrous

1C-47. Investigation of Coyote Creek Antimony Deposits, Garfield County, Utah. W. M. Traver. *U. S. Bureau of Mines,* Report of Investigations 4470, June 1949, 18 pages.

Ore-dressing tests on above ore. Sink-and-float testing, and jigging combined with tabling.

1C-48. Investigation of Sublette Ridge Vanadium Deposit, Lincoln County, Wyo. Paul T. Allsman, Forest H. Majors, Stanford R. Mahoney, and W. A. Young. *U. S. Bureau of Mines,* Report of Investigations 4476, June 1949, 8 pages.

Results of flotation tests and of heavy-media separation as applied to minus 2-in. ore.

1C-49. Concentration of Oxide Manganese Ores From Columbia and Elberta Mining Districts, Tooele and Juab Counties, Utah. (Wildcat, Sharp, and Aeronaut No. 1 Properties.) K. C. Dean and K. C. Vincent. *U. S. Bureau of Mines,* Report of Investigations 4466, June 1949, 11 pages.

Occurrence and nature of above ores; results of beneficiation. Amenability to concentration is indicated for the Wildcat and Sharp properties, but not for the Aeronaut No. 1.

1C-50. The Concentration of Beach Sands. Interim Report No. 1. Flotation of Zircon—Preliminary Studies. H. H. Dunkin and K. S. Blaskett. *Metallurgical Laboratory, University of Melbourne,* Joint Investigation No. 303 of the Council for Scientific and Industrial Research and the University of Melbourne, May 4, 1949, 27 pages.

First of a series of general reports. Details of a successful method for obtaining high recoveries of zircon in a high-grade concentrate. The method is shown to be applicable to samples of varying mineral composition drawn from several sources.

1C-51. Metallurgical Investigations of the Recovery of Zinc and Iron Sulfides From the Gray Zinc-Iron Deposit, Galena, Ill. H. Kenworthy. *U. S. Bureau of Mines,* Report of Investigations 4442, June 1949, 12 pages.

Data on table concentration, flotation, crushing and sizing, and sink-float treatment.

1C-52. Colorimetric Determination of Tin in Ores. (In Russian.) V. A. Nazarenko, L. E. Shvartzburd, and I. A. Soiferman. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 387-394.

Use of dithiol. Methods of preventing difficulties due to the presence of Mo, As, Sb, Ge, Te, V, and Cr.

1D—Light Metals

1D-7. Lime-Soda Sinter Process for Alumina From High-Silica Bauxites: Laboratory and Pilot-Plant Tests. John E. Conley and Milford L. Skow. *U. S. Bureau of Mines,* Report of Investigations 4462, June 1949, 67 pages.

Details of laboratory and pilot-plant tests. Steps include grinding, pelletizing, sintering, extraction, desilicating, carbonating, washing and calcining. A soda-recovery step allows recycling of this material. Tests were made on both Georgia and Arkansas bauxites. Satisfactory results were obtained with bauxite containing 20.6% SiO_2.

For additional annotations indexed in other sections, see: 2B-198-209; 25B-31

2 SMELTING, REDUCTION and REFINING

2B—Ferrous

2B-191. Improved Steelmaking Techniques. Ralph W. Farley, *Metal Progress,* v. 55, June 1949, p. 834-837, 878, 880.

Proceedings of 32nd annual meeting of National Openhearth Steel Committee of AIME held in Chicago in April. Description of Gary Works of Carnegie-Illinois Steel Corp., which was visited.

2B-192. Belgian Research on Nodular

Cast Iron. A. L. DeSy. *Metal Progress,* v. 55, June 1949, p. 838.

Includes a study of the systematic production of nodular cast irons and their malleablizing, and a theoretical inquiry into the formation of nodules. As-cast and annealed structures.

2B-193. Increasing Open Hearth Production by Use of Oxygen, Better Refractories and Control of Slag. Erle G. Hill. *Blast Furnace and Steel Plant,* v. 37, June 1949, p. 667-672.

Previously listed from *American Iron and Steel Institute,* item 2B-151, 1949.

2B-194. Studies Relating to the Control of Sulphur in the Production of Pig Iron. Truman H. Kennedy and Arthur W. Thornton. *Blast Furnace and Steel Plant,* v. 37, June 1949, p. 676-686.

Previously abstracted from *American Iron and Steel Institute,* item 2B-150, 1949.

2B-195. Further Notes by Morrogh on Nodular Cast Iron. H. Morrogh. *Iron Age,* v. 163, June 16, 1949, p. 64, 66, 68.

Lengthy "Letter to the Editor" attempts further refutation of Smalley's reply to a previous letter on the subject of priority with respect to development of nodular cast iron. (See "Some Notes on the History of Nodular Irons," May 19 issue.)

2B-196. The Electric Smelting of Iron Ores for Production of Alloy Irons and Steels and Recovery of Chromium and Vanadium. William Bleloch. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* v. 49, Mar. 1949, p. 363-402; discussion, p. 403-408.

Fundamental data on reduction of iron oxides; mechanism and velocity of their reduction; industrial electric pig-iron furnaces; metallurgical considerations; ores, fluxes, and coals suitable for electric smelting; burdening for electric smelting; and ore crushing and stock-yard equipment. A typical plant and economics of steam and gas turbines. Capital and production cost data; future trends; and electric smelting of ilmenite. 29 ref.

2B-197. Die Umsetzungen titanoxydhaltiger Kalksilikatschlacken mit kohlenstoffhaltigem Eisen als Grundlage zur Verhuttung titanhaltiger Eisenerze. (The Reactions of Lime Silica Slags With Carbonaceous Iron as a Basis for Smelting Titanium-Containing Iron Ores.) Hanns Wentrup, Helmut Maetz, and Paul Heller. *Archiv fur das Eisenhuttenwesen,* v. 20, Mar.-Apr. 1949, p. 139-150.

Experiments were made to establish optimum operating conditions for the above smelting process and to determine the conditions under which the undesirable liquation of titanium carbide from the pig-iron melt can be avoided. Correlates the reduction of Ti and Si with several smelting factors. Titanic acid has only a moderate effect on the desulfurization of pig iron with calcium silicate slag. 28 ref.

2B-198. Bau und Betrieb der Krupp-Rennanlage in Watenstedt. (Design and Operation of the Krupp Direct-Process Iron-Ore Reduction Plant in Watenstedt.) Dietrich Fastje. *Stahl und Eisen,* v. 69, May 12, 1949, p. 319-325.

Flow of material and arrangement of equipment. Technical and economic advantages. Plant description. 15 ref.

2B-199. Alloys and the Steel Industry. T. W. Merrill. *Iron and Steel Engineer,* v. 26, June 1949, p. 100-106; discussion, p. 107.

Uses, both as an aid in refining, and for improvement in final physical properties.

2B-200. More and Better Alloy Steels Produced by Use of Oxygen in Basic Electric Furnaces. *Industrial Heating,* v. 16, June 1949, p. 1015-1016. Condensed from paper by John E. Harrod.

Experiences at South Works, Carnegie-Illinois Steel Corp., Chicago.

2B-201. Some Aspects of Large and Small Blast Furnace Operations. G. P. Burks. *Industrial Heating,* v. 16, June 1949, p. 1018, 1020. A condensation.

The primary conclusion reached from this comparison of operations at Gary Works is that the iron production rate per unit of hearth area of large furnaces will approach that of small furnaces when high-grade raw materials are available for both. Conversely, as raw-material quality deteriorates, the small furnaces can be expected to maintain a proportionately higher iron production rate than the large ones.

2B-202. Gregg Comments on the Turbo Hearth. A. W. Gregg. *Iron Age,* v. 163, June 23, 1949, p. 46, 48, 50.

Discusses article by E. C. Bain and H. W. Graham on "The Turbo Hearth" (Apr. 21 issue.) This furnace is actually a side-blow or Tropenas converter. Cites article by Sims and Dahle (1942) showing that side-blown converter steel is as good as openhearth or electric-furnace steel in almost all respects. Use of oxygen-enriched blast in side-blow operation, outlining some recent experimental result. Six advantages of the side-blow over the bessemer converter.

2B-203. Oxygen Enrichment in the Low-Shaft Furnace. *Iron Age,* v. 163, June 23, 1949, p. 70. Condensed from *Iron and Coal Trades Review,* May 20, 1949.

Recent investigations in Trostberg, Bavaria, have shown that, in a small low-shaft furnace, a basic pig iron of normal analysis can be produced without difficulty, using an oxygen-enriched blast. A high-carbon ferrochrome has also been produced with an 80% oxygen blast.

2B-204. Nitrogen in Steel. Simon Feigenbaum and George H. Enzian. *Iron Age,* v. 163, June 30, 1949, p. 52-54.

Current research trends embracing control and analytical techniques. Investigations of the isolation and identification of nitrogen compounds. 14 ref.

2B-205. Sulphur Control and Manganese Conservation in Open Hearth Furnaces. Donald E. Babcock. *American Iron and Steel Institute,* Preprint, 1949, 62 pages.

Includes the combined blast furnace and openhearth operating problems, and the general solution of the problem. 38 ref.

2B-206. Die Flammenstrahlung des basischen Konverters. (Flame Radiation in the Basic Converter.) Gerhard Naeser and Werner Pepperhoff. *Stahl und Eisen,* v. 69, June 9, 1949, p. 391-398.

Glaser's spectral-analytical observations of the bessemer flame showed the possibility of terminating the melting process at any desired carbon content on the basis of the disappearing spectrum lines of luminous Mn vapors. Results of a study of this possibility and of the energy distribution in the total visible and infrared spectrum as a function of melting time. 11 ref.

2B-207. Zur Viskosität von Hochofenschlacken. (The Viscosity of Blast Furnace Slag.) Gerhard Behrendt and Theo Kootz. *Stahl und Eisen,* v. 69, June 9, 1949, p. 399-403.

Use of a new and simple viscosimeter. Viscosity of various regions of common slag systems is shown graphically and certain recommendations are made for controlling viscosity of slag by regulating its composition. 15 ref.

2B-208. La décarburation au four a arc basique. (Decarburization in a Basic Electric Arc Furnace.) M. Archard. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 6, Feb. 1949, p. 71-82.

Establishment of optimum conditions for decarburization consisted mainly in elimination of carbon content above 0.3%; establishing the rate of decarburization below 0.005% carbon per min.; and termination of decarburization before carbon content decreases below 0.1%.

2B-209. Blast Furnace Practice at Fontana. C. H. Lenhart. *Iron and Steel Engineer,* v. 26, July 1949, p. 35-43; discussion, p. 43-46.

Unusually good operating results are obtained, in spite of inferior and non-uniform raw materials, due to care taken in preparing the raw materials. Coke, ore beneficiation, limestone, and burdening of the furnace.

2B-210. Mangans inverkan pa de metallurgiska reaktionerna vid den basiska martinprocessen. (The Influence of Manganese Upon the Metallurgical Reactions in the Basic Open Hearth Process.) Sven Fornander. *Jernkontorets Annaler,* v. 133, no. 5, 1949, p. 163-190.

Thirty-six experimental heats were made at four different steelworks. A new method was developed for taking bath samples for oxygen determinations. The Mn content, which was varied between 0.15 and 2.3%, has no influence upon the oxygen content of the bath nor upon the rate of carbon drop. The carbon content was the factor having the greatest influence on the oxygen content during the refining period. The results do not indicate whether or not a high Mn content is beneficial. 23 ref.

2C—Nonferrous

2C-32. The Japanese Antimony Industry Utilizes Unique Method of Recovering Metal. *Mining World,* v. 11, June 1949, p. 46.

Lump ore is treated by the Herron Schmidt method. The stibnite is broken down by heat, the antimony volitalized, condensed, and recovered as Sb_2O_3, after which it is reduced to metal in a reverberatory furnace. Concentrates in the form of flotation froth are treated in a flash roaster. The froth is discharged into the roaster at 1000-1200° C. 99% of the antimony content is oxidized and volitalized. Gold and silver fall to the bottom of the roaster as finely divided metal.

2C-33. Making Fusible Alloys From Tin-Bearing Residues. A. G. Arend. *Canadian Metals and Metallurgical Industries,* v. 12, June 1949, p. 18-19, 36.

New methods, including electrorefining, which have made earlier, more complex methods obsolete.

2C-34. Nickel Alloys: The Birmingham Works of Henry Wiggin and Company, Limited. J. O. Hitchcock. *Metal Industry,* v. 74, June 3, 1949, p. 439-441.

Work done and developments made. Refining and working processes.

2C-35. A Study of the Separation of a Trace of Silver From a Macro Amount of Palladium by Electrolysis. J. C. Griess, Jr., and L. B. Rogers.

U. S. *Atomic Energy Commission*, AECD-2299, June 21, 1948, 16 pages.

Several complexing agents are used. Cyanide was found to produce the most favorable separation while allowing a nearly complete recovery of Ag. Repeated electrolyses are feasible, and the method can separate silver produced by neutron bombardment of lead, which has a high specific activity and which is chemically and radiochemically free from Pd. 22 ref.

2C-36. Um Apanhado Sobre o Estado Atual da Metalurgia do Litio. (Review of the Present State of Lithium Metallurgy.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasileira de Metais*, v. 5, Apr. 1949, p. 107-122.

Because of the increased demand for this metal and the large deposits of pegmatite in Brazil, the production of lithium in Brazil seems feasible. Comparative data for different methods of production; optimum methods as applied to Brazil.

2C-37. Um Apanhado Sobre o Estado Atual da Metalurgia do Zirconio. (Review of the Present State of Zirconium Metallurgy.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasileira de Metais*, v. 5, Apr. 1949, p. 123-142.

Bibliographical data concerning the physical and chemical properties of zirconium, method of production, and sphere of application. Different methods of zirconium recovery are critically analyzed. 18 ref.

2C-38. Um Apanhado Sobre o Estado Atual da Metalurgia do Columbio e do Tantalo. (Review of the Present State of Tantalum and Columbium Metallurgy.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasileira de Metais*, v. 5, Apr. 1949, p. 143-154.

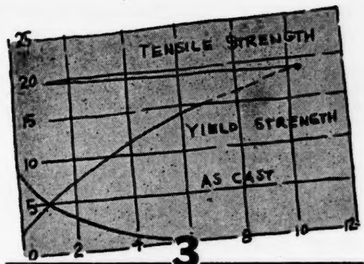
Progress in the metallurgy of tantalum and columbium on the basis of the literature. Considering that Brazil is the major producer of these metals, improvement in methods for their recovery is of great importance to that nation. 17 ref.

2D—Light Metals

2D-19. Um Apanhado Sobre o Estado Atual da Metalurgia do Berilio. (Review of the Present State of Beryllium Metallurgy.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasileira de Metais*, v. 5, Apr. 1949, p. 155-179.

Existing metallurgical processes for beryllium production. Methods of recovery and main spheres of application. 19 ref.

For additional annotations indexed in other sections, see: 16B-71; 17-58



3 PROPERTIES

3A—General

3A-137. The Influence of Fluctuations in Stress Amplitude on the Fatigue of Metals. T. J. Dolan, F. E. Richart, Jr., and C. E. Work. *American Society for Testing Materials*, Preprint 32, 1949, 34 pages.

Results obtained by investigation of fatigue life of metals subjected to repeated stresses fluctuating between two different amplitudes. Small high-speed rotating cantilever-beam fatigue-testing machines were used to test notched or unnotched specimens of three steels and of 75S-T Al alloy. Results shed light on the mechanism of fatigue failure.

3A-138. A Theory of Reflectivity and Emissivity. D. J. Price. *Proceedings of the Physical Society*, v. 62, sec. A, May 1, 1949, p. 278-283.

General theory applies to the Drude-Zener treatment of the optical properties of an ideal metal containing perfectly free electrons only. Disagreement with experimental observations indicates that the Drude-Zener treatment must be modified.

3A-139. The Weiss-Heisenberg Theory of Ferromagnetism and a New Rule Concerning Magnetostriction and Magneto-Resistance. J. L. Snoek. *Nature*, v. 163, May 28, 1949, p. 837-838.

Speculations indicating possibility of a new theory on the basis of a consideration of the properties of ranges of alloys in which the mean number of Bohr magnetons passes through an integral value.

3A-140. New Alloy Possesses High Electrical Resistivity. *Steel*, v. 124, June 20, 1949, p. 129.

Properties of alloy which has a specific resistance at 20° C. of 800 ohms per circular mil foot. Composition is not indicated.

3A-141. The Surface Photoelectric Effect. R. E. B. Makinson. *Physical Review*, ser. 2, v. 75, June 15, 1949, p. 1908-1911.

An expression for the photo-electric current produced at the surface of a metal. Validity of the assumption that the current from conduction electrons of a particular momentum can be expressed as the product of an excitation function and a transmission coefficient. Production in the photo-electric current of beat frequencies between spectral lines.

3A-142. Evidence for a Change in the Nature of Work Hardening at Small Strains. J. S. Koehler and T. H. Blewitt. *Physical Review*, ser. 2, v. 75, June 15, 1949, p. 1952-1953.

Based on the literature. Certain unanswered questions are raised.

3A-143. The Significance of the Criterion for Additional Plastic Deformation of Metals. D. C. Drucker. *Journal of Colloid Science*, v. 4, June 1949, p. 299-311.

The work of Mises and Prager is extended within the framework of present theories. Consideration is given to the simplest theories and to general types without time effects in which the loading criterion involves strain as well as stress and the path of loading has influence.

3A-144. Fracture of Ductile Metals. John E. Dorn. *Iron Age*, v. 164, July 7, 1949, p. 90-95, 100.

Influence of temperature, strain, and combined stresses, on fracturing. Emphasizes need for more comprehensive data on rate of growth of microcracks. 20 ref.

3A-145. A Reconsideration of Deformation Theories of Plasticity. D. C. Drucker. *Transactions of the American Society of Mechanical Engineers*, v. 71, July 1949, p. 587-590; discussion, p. 590-592.

Previously abstracted from *American Society of Mechanical Engineers*, Paper No. 48-A-81, 1948. See item 24A-15, 1949.

3A-146. Influence des fluctuations thermiques sur l'aimantation des substances ferromagnétiques massives. (Influence of Thermal Fluctuations on the Magnetization of Massive Ferromagnetic Substances.) Louis Néel. *Comptes Rendus* (France), v. 228, Apr. 4, 1949, p. 1210-1212.

A theoretical, mathematical analysis.

3A-147. Theories of Plastic Buckling. S. B. Batdorf. *Journal of the Aeronautical Sciences*, v. 16, July 1949, p. 405-408.

A new theory of plasticity which is of neither the flow nor the deformation type. It is based upon the concept of slip, and its formulation was guided more by physical, and less by mathematical, considerations than previous theories. Experimental evidence of limited scope is in better agreement with the new theory than with either flow or deformation theories. 15 ref.

3A-148. (Book) **Thermochemie der Legierungen.** (Thermochemistry of the Alloys.) Friedrich Weibke and Oswald Kubaschewski. 357 pages. 1943. Springer-Verlag, Berlin, Germany. (Reproduced 1948 by J. W. Edwards, Ann Arbor, Mich.)

Part I discusses basic methods for determining formation of alloys and the possibility of evaluating their e.m.f.'s and vapor pressures in thermodynamic terms. Part II summarizes information on heats of formation, solution, transformation, and fusion of 244 alloys; Part III discusses the correlation between the heats of fusion, and other characteristics related to the formation of alloys; and Part IV briefly outlines the metallurgical importance of thermochemical data.

3B—Ferrous

3B-130. The Influence of Conditions of Heat Treatment and Hot-Cold Work on the Properties of Low-Carbon N-155 Alloy at Room Temperature and 1200 F. J. W. Freeman, E. E. Reynolds, D. N. Frey, and A. E. White. *American Society for Testing Materials*, Preprint 21, 1949, 28 pages.

Mechanical-property ranges were found to be greater than those resulting from wide variations in chemical composition, showing why it has not been possible to correlate composition of the Cr-Ni-Co alloys with properties at high temperatures.

3B-131. The Use of Metals at Low Temperature. S. L. Hoyt. *Metal Prog-*

ress, v. 55, June 1949, p. 821-826.
Metallurgical and mechanical factors involved in the selection of metals for use at low temperature, with emphasis on ferritic steels.

3B-132. Abrasive Wear of Metals. Roy D. Haworth, Jr. *Metal Progress,* v. 55, June 1949, p. 842-848.
Effects of different abrading materials, speed, pressure, impact, moisture, and heat on the wear of metals, especially hard steel and cast iron.

3B-133. Fracture of Gray-Cast-Iron Tubes Under Biaxial Stresses. R. C. Grassi and I. Cornet. *Journal of Applied Mechanics,* v. 16 *(Transactions of the American Society of Mechanical Engineers,* v. 71), June 1949, p. 178-182.
Investigated for various ratios of axial to tangential stress ranging from pure tension to pure compression, yielding data for some stress ratios not previously reported. Analysis reveals that present theories do not account completely for the data obtained.

3B-134. Boron-Titanium Steels for Moderate Temperatures. *Iron Age,* v. 163, June 16, 1949, p. 90-92. Condensed from "Ferritic Low Alloy Boron-Titanium Steel for Use at Moderately High Temperatures", by G. F. Comstock.
Results of experiments on 13 low-carbon steels which show effects of addition of various amounts of B and Ti on grain growth and mechanical properties at normalizing temperatures above 1625° F.

3B-135. Niedriglegierte Warmarbeitsstähle. (Low-Alloy Hot-Worked Steel.) Helmut Krainer, Karl Swoboda, and Franz Rapatz. *Archiv fur das Eisenhuttenwesen,* v. 20, Mar.-Apr. 1949, p. 111-114.
Hardenability, high-temperature tensile and impact strengths, heat conductivities, thermal-shock resistances, and general suitability of 40 low-to-average carbon toolsteels containing low percentages of alloying elements.

3B-136. Dauerstandversuche an einigen unlegierten Thomasstählen und hochlegierten hitzebeständigen Stählen bei 500 bis 900°. (Creep-Stress Experiments on Several Unalloyed Basic Bessemer Steels and High-Alloy Heat Resistant Steels at 500-900° C.) Anton Pomp and Alfred Krisch. *Archiv fur das Eisenhuttenwesen,* v. 20, Mar.-Apr. 1949, p. 125-134.
The creep-stress resistance of the above steels was determined by several different methods, under nine different conditions, and for periods exceeding 1000 hours. The various methods and the results are critically evaluated. 53 ref.

3B-137. Warmverformtes Gusseisen — Ein universal verwendbarer Werkstoff. (Hot Worked Cast Iron—A Universally Useful Material.) E. Piwowarsky and A. Wittmoser. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 91, Apr. 15, 1949, p. 183-185.
Properties and uses.

3B-138. Ueber thermisch-beständiges Gusseisen. (Heat-Resistant Cast Iron.) Gerhard Clas and Karl Houben. *Die Neue Giesserei,* v. 36, (new ser., v. 2), May 1949, p. 131-138.
The main types of thermal stresses as well as the resulting physicochemical reactions. The thermal behavior of cast irons alloyed with Cr, Al, and Si. 12 ref.

3B-139. Effect of Boron on the Structure and Some Physical Properties of Plain Cast Irons. Alexander I. Krynitsky and Harry Stern. *Journal of Research of the National Bureau of Standards,* v. 42, May 1949, p. 465-479.
Previously abstracted from *American Foundrymen's Societty.* See item 3B-67, 1949.

3B-140. Verhalten des Stahles bei erhöhten Temperaturen; Uebersicht uber das Schrifttum der Jahre 1944 bis 1947. (The Behavior of Steel at Elevated Temperatures; Survey of the Literature Published in the Years 1944-1947.) (Concluded.) Anton Pomp. *Stahl und Eisen,* v. 69, May 12, 1949, p. 339-342.
19 ref.

3B-141. Einflusse von sekundärer Biegung und inneren Drucken auf die Lebensdauer von Stahldrahtseilen. (Effects of Secondary Bending and Internal Pressures on the Life of Steel-Wire Cables.) Hermann Altpeter. *Stahl und Eisen,* v. 69, May 26, 1949, p. 381-385.
Theoretical and mathematical investigation of the problem.

3B-142. Zähigkeits- und Härtemessungen an Stahl bei tiefen Temperaturen. (Low-Temperature Tenacity and Hardness Measurements on Steel.) Alfred Krisch. *Stahl und Eisen,* v. 69, May 26, 1949, p. 386.
Recently reported German data obtained at temperatures of 20 to −183° C. on 12 carbon and low-alloy steels.

3B-143. Developments in Alloy Steels. E. Barber. *Canadian Mining Journal,* v. 70, June 1949, p. 71-73.
Details of the various test methods evolved simultaneously.

3B-144. Elastic and Fracture Toughness Studies of a Stainless Steel. Carl W. Muhlenbruch. *American Society for Testing Materials,* Preprint 24, 1949, 16 pages.
Type 301 sheet and rod of several tempers was shown to have great elastic and fracture toughness, the former being defined as the area under the stress-strain diagram at the yield strength and the latter as the same area at ultimate load. Theoretical fracture toughness thus determined is compared with values obtained from tension-impact tests. Results were found to agree within 14%.

3B-145. Static Properties of Cast Steels. Harry A. Schwartz. *Foundry,* v. 77, July 1949, p. 70-73, 184, 186.
Attempts to show which values of tensile strength, yield strength, elongation, reduction of area, and Brinell hardness can be expected simultaneously in cast steels given unlimited choice as to composition and heat treatment. Almost 100 steels were investigated in 5-25 heat treated states. Range of compositions to which the conclusions apply is approximately as follows: C, 0.24-0.52%; Si, 0.28-0.89%; Mn, 0.46-1.70%; Ni, trace to 3.35%; Cr, trace to 1.12%; Mo, trace to 0.49%; V, trace to 0.15%; and Cu, trace to 1.64%.

3B-146. Use of Tellurium in Promoting Chills on Gray Iron Castings. C. R. Austin. *Foundry,* v. 77, July 1949, p. 74-77.
Some of the properties and structural changes which may be induced by the controlled use of tellurium metal. Macrographs show fracture structures.

3B-147. Action du froid sur la contrainte réelle de rupture et la capacité de déformation de l'acier chargé en hydrogene. (Effect of Low Temperatures on the True Resistance to Fracture and on the Capacity for Deformation of Steel With a High Hydrogen Content.) Paul Bastien and Pierre Azou. *Comptes Rendus* (France), v. 228, Apr. 20, 1949, p. 1337-1339.
Stress-strain curves of annealed low-carbon steel (0.15% C) were determined between 15 and −70° C. Three cases were studied: steel under ordinary conditions, charged with hydrogen by electrolysis for 48 hr. in a solution of HCl, and charged by simple etching in this solution.

3B-148. Comportement mécanique des métaux polycristallins: analogie des facteurs fragilisants. (Mechanical Behavior of Polycrystalline Metals: Analogy of "Fragility Factors.") René Castro and André Gueussier. *Comptes Rendus* (France), v. 228, Apr. 20, 1949, p. 1339-1341.
Charted data (using six different low-alloy steel specimens) indicate the possibility of using a new factor designated as "fragility factor," which is a constant value for the given type of metal fully characterizing its mechanical properties.

3B-149. Influence du cuivre sur les caractéristiques d'un acier russe au chrome. (Influence of Copper on the Characteristics of a Russian Chromium Steel.) I. N. Latounzov. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 6, Feb. 1949, p. 67-69. Translated and condensed from *Stal* (Steel), v. 8, Mar. 1948, p. 255-258.
The influence of Cu additions on chemical and physical properties of a Cr steel (0.95-1.10% C; 0.20-0.40% Mn; 0.15-0.35% Si; 1.30-1.65% Cr; 0.3% max. Ni; 0.02% max. S and 0.027% max. P) was investigated.

3B-150. Selection of Heat Resistant Steels. I. J. B. Henry. *Product Engineering,* v. 20, July 1949, p. 113-118.
Factors influencing steels for high-temperature service include strength, ductility, and fatigue resistance at operating temperatures, as well as resistance to oxidation and corrosion caused by other media in contact with the metal. (To be continued.)

3B-151. A Recent Development in Soft Magnetic Materials. H. H. Scholefield. *Journal of Scientific Instruments and of Physics in Industry,* v. 26, June 1949, p. 207-209.
Development, manufacture, structure, and properties of a new magnetic material "H.C.R." (Ni-Fe), characterized by a rectangular hysteresis loop, particularly suitable for use in electronic circuits. Correlation of magnetic properties with preferred orientation.

3C—Nonferrous

3C-123. The Vapor Pressure of Tellurium and Selenium. L. S. Brooks. *U. S. Atomic Energy Commission,* AECD-2546, Sept. 10, 1948, 12 pages.
Results of measurement with quartz Bourdon gages. 16 ref.

3C-124. Die Einmundung in die magnetische Sättigung bei Nickel unter Zugspannung. (The Inception of Magnetic Saturation of Nickel Under Tensile Stress.) Otto Buhl. *Zeitschrift fur Physik,* v. 126, Apr. 4, 1949, p. 84-97.
The theory correctly expresses the measured constants of two nickel carbonyl specimens when one assumes, in addition to the tensile-stress zone, an area of disarranged internal plastic deformation stresses exceeding by several times the amount of external tensile stresses. 19 ref.

3C-125. The Electrical Conductivity of Germanium. E. H. Putley. *Proceedings of the Physical Society,* v. 62, sec. A, May 1, 1949, p. 284-292.
Measurements. The results are explained by the theoretical calculations of Shifrin and are used to deduce the concentration of impurity

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   - Mill operations, ferrous and nonferrous.
   - Production of castings.
   - Improved applications of specific metals and of such metal-forms as castings, forgings, stampings, weldments, powder metal parts, tubing.
   - Forging, stamping and press-shop operations.
   - Machining operations that involve improved application of toolsteels, tool materials, cutting compounds or the metallurgical condition of the work being machined.
   - Heat treatment—equipment, processes and supplies.
   - Welding, brazing, and mechanical joining.
   - Surface cleaning and finishes.
   - Inspection of mass production.
6. All entries must describe actual achievements; names of individuals, plants and products involved must be cited.
7. Cash awards will be made by a committee of judges appointed by the President of the American Society for Metals. Their decision will be final.
8. If the judges find other entries to have special merit, an appropriate citation and certificate will be issued.
9. Submission of entries shall be regarded as evidence of release for publication by the American Society for Metals.

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CONTEST EDITOR

ECONOMY-IN-PRODUCTION

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centers and of thermally excited electrons and the position of the impurity levels.

3C-126. Konstitution und Farbe des kolloiden Goldes. (The Constitution and Color of Colloidal Gold.) Wolfgang Pauli. *Helvetica Chimica Acta,* v. 32, May 2, 1949, p. 795-810.

Experimental methods and reported results. 46 ref.

3C-127. Metastable States of Nickel. J. J. Knight. *Nature,* v. 163, May 28, 1949, p. 839-840.

In view of a recent communication by Snoek and Fast on metastable states in well-annealed nickel, a similar effect noted during some investigations on nickel magnetostrictive oscillators is described. Suggests possibility that these metastable conditions can be employed for a highly efficient magnetostrictive transducer, which could be used in special circumstances.

3C-128. The Elimination by Lithium of Bismuth Embrittlement in Deoxidized Coppers and Copper Alloys. W. A. Baker and A. P. C. Hallowes. *Journal of the Institute of Metals,* v. 75, May 1949, p. 741-758.

Of a number of elements including Ce, Mg, and the alkali metals, which form compounds with Bi, only Li was found to provide substantial freedom from embrittlement in notched-bar tests on nonarsenical Bi-containing Cu. The optimum range of Li contents, and the effect of Li additions to deoxidized arsenical coppers and a number of Cu alloys containing Bi. The chemical method for determination of Li in nonarsenical coppers and a note on spectrographic determination.

3C-129. Elasticity of Zinc Crystals. C. A. Wert and E. P. T. Tyndall. *Journal of Applied Physics,* v. 20, June 1949, p. 587-589.

Young's modulus was measured by dynamic and static methods for 25 Zn single crystals. 1/E is plotted against the square of the cosine of the orientation. From constants of the resulting curve and earlier data on linear compressibility by Bridgman, numerical values for the coefficients of compliance are derived. Data on three crystals were taken from room temperature to 375° C., which makes possible computation of Young's modulus for any orientation and any temperature in the range given. 12 ref.

3C-130. Inelastic Scattering of Low Speed Electrons From a Copper Single Crystal. Paul P. Reichertz and H. E. Farnsworth. *Physical Review,* ser. 2, v. 75, June 15, 1949, p. 1902-1908.

Energy distribution of inelastically scattered electrons from a (100) face of a copper single crystal was investigated by the electrostatic-deflection method.

3C-131. Elastic Constants and Internal Loss of Single Nickel Crystals. R. M. Bozorth, W. P. Mason, H. J. McSkimin, and J. G. Walker. *Physical Review,* ser. 2, v. 75, June 15, 1949, p. 1954-1955.

Velocities and approximate attenuations as measured for two nickel crystals.

3C-132. Solubility of Protactinium in the Common Acids. Roy C. Thompson. *U. S. Atomic Energy Commission,* AECD-2488, Oct. 7, 1946, 4 pages.

Study of the above in HNO_3, HCl, H_2SO_4, $HClO_4$, and HF leads to the conclusion that solubility may be attributed largely, if not entirely, to formation of complex ions.

3C-133. Sur le trainage magnétique des métaux massifs. (Magnetic "Drag" of Massive Metals.) Israel Epelboin and André Marais. *Comptes Rendus* (France), v. 228, Mar. 28, 1949, p. 1110-1112.

Proposes a variation of the Euler equation for determination of the above. This formula also permits determination of other variables such as permeability and the characteristic coefficients α and β of the magnetic structure. Curves for permeability as a function of percentages of dissolved and unpolished sections are presented for 76% Permalloy and Mumetal.

3C-134. Ceramic-Metal Alloy Has Thermal Shock Resistance Needed for Turbine Blades. *Product Engineering,* v. 20, July 1949, p. 150-151.

Investigation of an alloy containing 80% TiC and 20% Co conducted at the NACA Lewis Laboratory to determine resistance to thermal shock, short-time tensile strength at elevated temperatures, and performance characteristics under simulated service test conditions.

3C-135. Zirconium Metal, as of 1949. Iodide-, Magnesium-Reduced and Calcium-Reduced Zr. R. I. Jaffee. *Journal of Metals,* v. 1, sec. 1, July 1949, p. 6-9.

Analyses, mechanical properties, physical properties, and corrosion resistance. Covers only unalloyed Zr.

3C-136. The Comparative Creep Properties of Several Types of Commercial Coppers. A. D. Schwope, K. F. Smith, and L. R. Jackson. *Journal of Metals,* v. 1, sec. 3, July 1949 *(Metals Transactions,* v. 185), p. 409-416.

Effect of cold work on creep characteristics of tough-pitch and OFHC coppers, unalloyed and silver bearing, was determined for temperatures from 200 to 572° F.

3C-137. The Vapor Pressures of Zinc and Cadmium Over Some of Their Silver Alloys. C. E. Birchenall and C. H. Cheng. *Journal of Metals,* v. 1, sec. 3, July 1949, *(Metals Transactions,* v. 185), p. 428-434.

The above were measured over a temperature range of about 200° C. Thermodynamic activities and activity coefficients were calculated for the volatile component in each case. Free energies of solution for liquid Zn and Cd in solid Ag were computed for comparison with those of Cu-Zn. Free energies of these systems were compared with each other and Cu-Cd with respect to size factor, electronegativities, and the progression of stable phases in the phase diagram. 22 ref.

3C-138. Photoelectric and Thermionic Properties of Nickel. Alvin B. Cardwell. *Physical Review,* ser. 2, v. 76, July 1, 1949, p. 125-127.

The above properties of spectroscopically pure Ni were studied over a wide range of temperatures including the Curie point, 350° C. Samples were studied after having been subjected to long outgassing processes. 13 ref.

3D—Light Metals

3D-49. Inelastic Scattering of Protons by Magnesium and Aluminium. E. H. Rhoderick. *Nature,* v. 163, May 28, 1949, p. 848-849.

Including some work on scattering by Be.

3D-50. Some Effects of Silicon on the Tendency to Cracking in Aluminium-Copper-Magnesium Alloys of High Purity. W. I. Pumphrey and D. C. Moore. *Journal of the Institute of Metals,* v. 75, May 1949, p. 727-736.

It was found that there is marked progressive reduction in susceptibility to cracking of alloys containing 2.5-4% Cu and 0.5-1% Mg with increase in Si content from 0.5-4%. When such alloys are to be used for welding, Si content should be as high as practicable, of the order of 1.5%, consistent with successful heat-treatment, and Cu content as high as permissible within the specified range. 10 ref.

3D-51. Effect of Magnesium on Aluminum-Copper-Silicon Casting Alloys. R. A. Quadt and J. J. Adams. *Foundry,* v. 77, July 1949, p. 88-90, 240.

Effect of Mg on the mechanical properties of aluminum casting alloys containing 3-5% Cu and 5-8% Si. Effect of stress-relieving heat treatment at 450° F.

3D-52. Liquid Solubility of Manganese in a Magnesium-Aluminum-Tin Alloy. B. J. Nelson and G. F. Sager. *Journal of Metals,* v. 1, sec. 3, July 1949 *(Metals Transactions,* v. 185), p. 405-408.

Compositions and properties of Mg forging alloys, Mn segregation in AM65S, liquid solubility determinations, and effect of Mn on tensile properties and resistance to corrosion.

3D-53. Hot-Tearing. Factors Controlling Its Incidence in Aluminium Alloys. D. C. G. Lees. *Metal Industry,* v. 74, June 24, 1949, p. 507-509.

The freezing process; tensile test results; the concept of "eutectic index," showing the relationship of proportion of eutectic present to hot-tearing behavior.

For additional annotations indexed in other sections, see:
4A-69; 4B-60-64; 9-177; 22A-153; 23A-17; 23B-38; 23D-60

4A—General

4A-65. Symmetry Properties of Wave Functions in Crystals. Part I. Two Dimensional Lattices. Part II. Three-Dimensional Lattices. T. Venkatarayudu and T. S. G. Krishnamurty. *Proceedings of the Indian Academy of Sciences,* v. 29, sec. A, Mar. 1949, p. 137-161.

Quantum mechanical considerations for these types of lattice, including symmetry properties of the wave vectors and the sticking of Brillouin zones.

4A-66. Modern Descriptive Theories of Precipitation Processes. H. K. Hardy. *Journal of the Institute of Metals,* v. 75, May 1949, p. 707-726.

The most recent theories. Their interrelation and significance in regard to age hardening. Aspects for which no adequate explanation has yet been offered. 41 ref.

4A-67. Strengths of Metals. H. Lipson and A. R. Stokes. *Nature,* v. 163, June 4, 1949, p. 871.

No experimental method has been suggested for recording directly the pure diffraction broadenings of X-ray reflections; there is always an appreciable amount of broadening due to experimental conditions. In

any statement of results, therefore, it is essential that the procedure used be stated. Comments on the fact that Wood and Rachinger's recent letter to *Nature* does not give this information. Nevertheless, striking agreement was obtained for the yield stresses of a number of metals when the values of Wood's "limiting crystallite size" are substituted in Bragg's theoretical expression. This agreement results also from the theory that the broadening of the reflections is due to inhomogeneous internal stresses. 10 ref.

4A-68. (Book) **Alloy Systems.** James Osborn Lord. 380 pages. 1949. Pitman Publishing Corp., 2 West 45th St., New York 19. $5.00.

A textbook intended to bridge the gap between elementary physics and chemistry courses and fundamental concepts. The latter include the phase rule and binary phase diagrams, thermochemical equilibrium, mass-action equations, and atomic structure of crystals. Describes different types of binary equilibrium diagrams, giving precise instructions for their interpretation. Chapters are supplemented with questions and problems.

4A-69. (Book) **Structure and Properties of Alloys.** Ed. 2. R. M. Brick and Arthur Phillips. 485 pages. 1949. McGraw-Hill Book Co., 330 West 42nd St., New York 18. $6.00.

This edition has been expanded to include new material, discussion of additional alloys, and expansion of sections for fuller understanding. Presents correlation of phase diagrams, structures, and properties of alloys, proceeding from the simplest to the most complex alloys. Photomicrographs illustrate normal structures, their origins, deviations caused by mistreatments, etc.

4B—Ferrous

4B-60. Effect of Bainite on Properties. *Metal Progress,* v. 55, June 1949, p. 868, 870, 872. Translated and condensed from "Effect of Bainitic Structures on the Mechanical Properties of a Chromium-Molybdenum Steel," U. Wyss, *Von Roll Mitteilungen,* v. 7, Dec. 1948, p. 51-70.

Previously abstracted from original, item 4B-48, 1949.

4B-61. New Structural Diagrams for Alloy Cast Irons. H. Laplanche. *Metal Progress,* v. 55, June 1949, p. 839-840, 840B, 841.

Established on the basis of Si-C ratio, and the tendency of the carbide to be dissociated into graphite and ferrite during solidification. Numerical results for a series of pure cast irons.

4B-62. Pearlitic Structure Effect on Brittle Transition Temperature. Nicholas Grossman. *Welding Journal,* v. 28, June 1949, p. 265s-269s.

Tests on a plain, low-carbon-steel plate to determine effects of fineness of pearlite and grain size on the transition temperature of a specimen with a given geometry. Order and magnitude of the lowering of transition temperature from coarse to fine pearlite appeared to be about the same as that for the transition from large to small grains.

4B-63. Graphitization in the Malleable Iron Process. H. G. Hall. *Foundry,* v. 77, June 1949, p. 88-90, 212, 214, 216, 218, 220, 222, 224-225; July 1949, p. 92-95; 234-240.

Previously abstracted from condensed version in *Foundry Trade Journal.* See item 4B-11, 1949.

4B-64. Soft Magnetic Materials. E. A. Gaugler. *Product Engineering,* v. 20, July 1949, p. 84-89.

Composition, heat treatment, and properties of magnetic iron, silicon steel, Ni-Fe alloys, Fe-Co alloys, Fe-Ni-Co alloys, and the mixed ferrites.

4B-65. The Study of Grain Boundaries With the Electron Microscope. J. F. Radavich. *Journal of Metals,* v. 1, sec. 3, July 1949 *(Metals Transactions,* v. 185), p. 395-398.

Brittle steels were examined with an optical microscope to ascertain the nature and amount of impurities present. Due to the relatively low resolving power of the microscope, impurities are not visible in fine detail.

4B-66. Influence du chrome sur la graphitisation des fontes blanches. (Influence of Chromium on Graphitization of White Cast Iron.) Gabriel Joly. *Fonderie,* Apr. 1949, p. 1537-1544.

Investigation on a white cast iron containing 2.16% C, 1.50% Si, 0.43% Mn, 0.09% S, and 0.13% P, with 10 different additions of Cr ranging from 0.032 to 0.137%.

4C—Nonferrous

4C-60. Effect of Neutron Bombardment on Order in the Alloy Cu_3Au. Sidney Siegel. *Physical Review,* ser. 2, v. 75, June 15, 1949, p. 1823-1824.

Samples in the ordered and disordered states were exposed in a nuclear reactor subject to an integrated fast-neutron flux up to 3.3×10^{-19} neutron per sq. cm. Electrical resistivity, and presumably the disorder, in the initially ordered samples increased, while little change was observed in the initially disordered samples.

4C-61. Effect of Neutron Bombardment on Order in the Alloy Cu_3Au. Sidney Siegel. *U. S. Atomic Energy Commission,* AECD-2465, Feb. 1, 1949, 2 pages.

4C-62. Sur les équilibres des systemes complexes riches en plomb contenant du zinc et d'autres éléments. (Equilibria of Complex Systems With High Lead Contents Containing Zinc and Other Elements.) Léon Jollivet. *Comptes Rendus* (France), v. 228, Mar. 28, 1949, p. 1128-1130.

Experimental investigation of several ternary systems. In particular, the Pb-As-Zn system was studied for the first time.

4C-63. Uber das System Zinn-Antimon-Schwefel. (The Tin-Antimony-Sulfur System.) Rudolf Vogel and Werner Gilde. *Zeitschrift fur Metallkunde,* v. 40, Apr. 1949, p. 121-126.

Results of thermal and microscopic investigations of the ternary system SbSn-SnS-Sb_2S_3, and of the binary system SnS-Sb_2S_3, showing that Sn has a greater affinity for S than has Sb. Constitution diagrams and photomicrographs.

4C-64. Ausdehnungsmessungen an binären Mischkristallen mit rucklaüfiger Löslichkeitskurve und an Metallen mit starken Gitterstörungen. (Expansion Measurements on Binary Solid Solutions Having Retrograde Solubility Curves and on Metals Having Large Lattice Distortions.) Ernst Raub and Karl Wolff. *Zeitschrift fur Metallkunde,* v. 40, Apr. 1949, p. 126-134.

Results of measurements on two Ag-Cu alloys containing 7 and 93% Cu, respectively; on Ag-Pb and Ag-Th alloys; and on silver electrodeposits containing nonmetallic inclusions. The results confirm the suitability of expansion measurements for investigation of normal segregation processes. Segregation of electrodeposited alloys is accompanied by large lattice distortions at low temperatures.

4C-65. Der Verlauf der Liquidus- und Soliduskurve im System Zink-Aluminium zwischen 30 und 70% Al. (Liquidus and Solidus Curves in the Zinc-Aluminum System Between 30 and 70% Al.) Erich Pelzel. *Zeitschrift fur Metallkunde,* v. 40, Apr. 1949, p. 134-136.

Determined by means of thermal analysis and quenching. Results are evaluated and compared with those of other authors.

4C-66. Gleichgewichtsuntersuchungen in den Systemen Zink-Aluminium und Zink-Aluminium-Kupfer. (Investigations of Equilibria in the Zinc-Aluminum and Zinc-Aluminum-Copper Systems.) Erich Gebhardt. *Zeitschrift fur Metallkunde,* v. 40, Apr. 1949, p. 136-140.

Deals with a wide range of Zn-Al compositions and with the same compositions plus 1-3% Cu. Experimental methods. Results are compared with those obtained by other authors.

4C-67. Transformation of Gamma to Alpha Manganese. E. V. Potter, H. C. Lukens, and R. W. Huber. *Journal of Metals,* v. 1, sec. 3, July 1949 *(Metals Transactions,* v. 185), p. 399-404.

Changes in structure and resistivity of electrolytic Mn as it transformed from ductile gamma to brittle alpha Mn were determined. Transformation theory and transformation rates.

4D—Light Metals

4D-38. Diffusion of Hydrogen Through Aluminum Tubes. Allen S. Russell. *Metal Progress,* v. 55, June 1949, p. 827-831.

Rate of diffusion through a particular type of Al tube was measured from 100 to 500° C. and at pressures of 1-75 cm. Hg. The rate was found to change rapidly with time at moderate temperatures. No significant data on the effect of temperature and pressure were obtained. The sample recrystallized and considerable grain growth occurred during the measurements. No large increase in total oxide-film thickness was observed. The rate was increased more than five-fold by high-voltage discharge. Diffusion of oxygen at 1 atm. at 500° C. was immeasurably low.

4D-39. Behaviour of Crystal Boundaries in Aluminium and Its Alloys During Melting. W. I. Pumphrey and J. V. Lyons. *Nature,* v. 163, June 18, 1949, p. 960-961.

4D-40. Dispersion des frequences des ondes acoustiques dans l'aluminium. (Dispersion of the Frequencies of Acoustic Waves in Aluminum.) Ph. Olmer. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 46, Jan.-Feb. 1949, p. 20-25.

On the basis of the shape of the curves, certain conclusions were drawn concerning the characteristics of interactions among atoms in the interior of the crystal.

4D-41. Kalt- und Warmaushärtung einer Aluminium-Silizium-Magnesium-Gusslegierung. (Cold and Warm Age Hardening of an Aluminum-Silicon-Magnesium Cast Alloy.) Gustav Gurtler and Herta Weigelt. *Zeitschrift fur Metallkunde,* v. 40, Apr. 1949, p. 147-155.

Experimental results for an Al alloy containing 9.5% Si, 0.5% Mg, 0.3-0.4% Mn, and 0.3-0.4% Fe. Age hardening was conducted for periods up to nine months at 20, 100,

150, 200, 250, and 300° C. Changes in hardness and structure are shown.

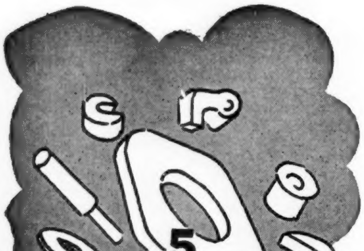
4D-42. Recherches au microscope électronique sur les précipitations dans les alliages d'aluminium. (Research on Precipitation in Aluminum Alloys Using the Electron Microscope.) Raymond Castaing. *Comptes Rendus* (France), v. 228, Apr. 20, 1949, p. 1341-1343.

Submicroscopic precipitation present in an annealed Al-Cu alloy containing 4% Cu was particularly studied. Results indicate the presence of a precipitate (Al_2Cu) in the form of small plates oriented parallel to the aluminum base. Metallographic results will be published later.

4D-43. Relation entre la grosseur du grain de recristallisation de l'aluminium de haute pureté et ses propriétés mécaniques. Influence des faibles additions sur la grosseur du grain. (Relation Between the Size of Recrystallized Grains of High-Purity Aluminum and Mechanical Properties. Influence of Small Additions on the Grain Size.) Henri Chossat. *Comptes Rendus* (France), v. 228, Apr. 20, 1949, p. 1344-1345.

The above was investigated for aluminum of 99.99 and 99.998% purity, differently heat treated.

For additional annotations indexed in other sections, see:
2B-192-204; 3A-139; 3B-131-139-146-151; 3D-53; 7B-139; 10A-105; 11-223-241; 23A-17



5 POWDER METALLURGY

5A—General

5A-39. Magnets From Pure Iron Powder. Robert Steinitz. *Metal Progress*, v. 55, June 1949, p. 858, 860, 862, 864, 866, 868.

Previously abstracted from *Powder Metallurgy Bulletin*, item 5B-1, 1949.

5A-40. Powder Metallurgy. J. F. Mills. *Mine & Quarry Engineering*, v. 15, June 1949, p. 175-181.

Processes, products, and applications.

5A-41. Scope and Limitations of the Powder Metallurgy Process. E. Raymond Engstrand, Kenneth M. Gleszer, and John W. Polonetz. *Product Engineering*, v. 20, July 1949, p. 123-127.

Mechanical, electrical, structural, and special parts can be adapted to powder metallurgy. Design limitations and subsequent operations of machining, coining, hardening, and finishing. Physical characteristics of test bars are tabulated. Includes design diagrams.

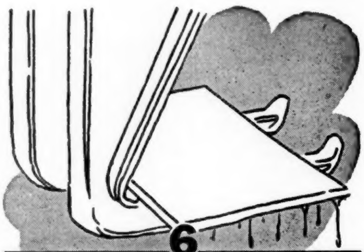
5A-42. (Book) Pulvermetallurgie und Sinterwerkstoffe. (Powder Metallurgy and Sintered Materials.) Ed. 2. Richard Kieffer and Werner Hotop. 412 pages. 1948. Springer-Verlag, Berlin, Germany.

A comprehensive summary review of the most important domestic and foreign literature on methods for a wide variety of powdered metals.

5C—Nonferrous

5C-13. Duktile Sinterwerkstoffe. (Ductile Sintered Materials.) Otto Landgraf. *Metall*, v. 3, June 1949, p. 184-186.

Methods of production, with special emphasis on Ag-W and Cu-W alloys.



6 CORROSION

6A—General

6A-68. Chemical Aspects of Underground Corrosion and Corrosion Prevention. I. A. Denison. *American Gas Association, Proceedings*, 1948, p. 517-533.

Behavior of various ferrous and nonferrous metals and alloys underground with respect to both environment and composition of material. Influence of oxygen, soil reaction, soluble salts, and CO_2 on ferrous metals. 21 ref.

6A-69. Why Metals Corrode. Herbert H. Uhlig. *Corrosion*, v. 5, June 1949, p. 169-174.

Contact potentials, single electrode potentials, types of cells, corrosion tendencies of metals, corrosion and hydrogen overvoltage, depolarization, action of bacteria, effect of oxygen concentration, surface corrosion products, and corrosion control. 12 ref.

6A-70. Erosion-Corrosion of Metals and Alloys. M. G. Fontana and W. A. Luce. *Corrosion*, v. 5, June 1949, p. 189-193.

High velocity tests on steel, cupro-nickel, and lead which are said to be more reliable than conventional test methods for predicting performance of actual equipment.

6A-71. Corrosion of Telephone Outside Plant Material. K. C. Compton and A. Mendizza. *Corrosion*, v. 5, June 1949, p. 194-197.

Problems resulting and methods of meeting them. Materials include hot-dip-galvanized iron and steel, aluminum, and copper. 10 ref.

6A-72. Verhalten von metallischen Werkstoffen gegenuber sehr verdunnten, wässrigen Lösungen. (Behavior of Metals in Very Dilute Aqueous Solutions.) H. L. W. Haase. *Archiv fur Metallkunde*, v. 3, Mar. 1949, p. 96-99.

Tests showed that the differences in the behavior of the various metals, including the noble metals, depend largely, if not entirely, on the chemical behavior and structures of the oxidation products. Relationship of oxygen concentration to the position of the metal in the electrochemical series; and effect of the reactions of the corrosion products with alkalies on corrosion resistance.

6A-73. Uber die unterschiefliche Bewertung der Angriffskraft von Wässern. (Concerning Different Evaluations of the Corrosiveness of Water.) L. W. Haase. *Archiv fur Metallkunde*, v. 3, Mar. 1949, p. 114-117.

The various factors that determine the corrosiveness of bicarbonate-containing waters on ferrous and nonferrous metals.

6A-74. The Analysis of Corrosion-Time Curves. F. A. Champion and M. Whyte. *Journal of the Institute of Metals*, v. 75, May 1949, p. 737-740.

Empirical corrosion-time curves usually conform to one of four typical equations: rectilinear, parabolic, logarithmic, and exponential. Method for accurate fitting of data to the logarithmic curve, which is particularly useful for relatively low rates of oxidation or corrosion.

6A-75. Fatty Acids Versus Construction Materials. *Chemical Engineering*, v. 56, June 1949, p. 243-244.

Part III of a symposium in which a representative group of construction materials is evaluated for services involving fatty acids. Consists of "High-Silicon Irons", Walter A. Luce; and "Aluminum", Ellis D. Verink, Jr.

6A-76. High Temperature Corrosion of Metals. Andrew Dravieks and Hugh J. McDonald. *Industrial Gas*, v. 27, June 1949, p. 6. A condensation.

Problems of chemical attack of gases taking place in gas turbines, jet propulsion motors.

6A-77. Marine Corrosion Findings at Kure Beach Reviewed for Editors. *Chemical and Engineering News*, v. 27, June 27, 1949, p. 1867.

Accomplishments disclosed to professional and trade paper editors during a tour of the above experimental facilities. Large-scale adoption of Mg anodes for metal underwater dock facilities, complete absence of corrosion attack on titanium, and the discovery that permanent immersion of part of steel test strips greatly reduces corrosion rates as compared to strip not in continuous contact with water were three of the highlights.

6A-78. Kure Beach Metal Corrosion Tests Corroborate Existing Theories Under Actual Service Conditions. E. C. Kreutzberg. *Steel*, v. 124, June 27, 1949, p. 88, 91.

Results of exposure tests to sea water and marine atmospheres. Special attention is given to various steel alloys.

6A-79. Kinetic and Structural Factors Involved in Oxidation of Metals. Earl A. Gulbransen. *Industrial and Engineering Chemistry*, v. 41, July 1949, p. 1385-1391.

Methods used in fundamental study of the above, and results of rate studies on oxidation of Mo, Fe, W, Al, and Mg. The role of the secondary structure of the oxide film is emphasized. 23 ref.

6A-80. Foiled by Aluminum. *Industrial and Engineering Chemistry*, v. 41, July 1949, p. 7A, 10A.

Work on corrosion resistant metals for sprinkler irrigation piping. Use of 63S-T6 and 61S-T6 Al alloys proved most satisfactory, although there are a few areas where galvanic corrosion is a problem. Use of sacrificial anodes for the latter is being studied.

6A-81. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 41, July 1949, p. 63A-64A.

Some of the equipment and procedures being used in a research program on corrosion by liquids at

elevated temperatures and pressures started last fall at Ohio State University under sponsorship of Alloy Casting Institute.

6A-82. Corrosion Inhibitors in Recirculating Water Systems. Marc Darrin. *Canadian Chemistry and Process Industries,* v. 33, June 1949, p. 512-516.
Inhibitors which function through anodic polarization. Many types of inhibition and a variety of practical applications are illustrated. 16 ref.

6A-83. Sulfur, Dew Point and Boiler Availability. Stephen Juhasz. *Combustion,* v. 20, June 1949, p. 55-58. Translated and condensed from *Teknisk Tidskrift* (Sweden), Jan. 22, 1949.
Sulfur content of fuel and flue gas is discussed in relation to deposits and corrosion of boiler and superheater surfaces. Problems of dew-point measurement, and a dew-point meter developed by the author. The economics of corrosion resisting materials and means of reducing corrosion difficulties.

6A-84. Corrosion Guide for Fasteners. *Product Engineering,* v. 20, July 1949, p. 161.
Chart evaluating corrosion resistance of materials used for screws, bolts, studs, and other fasteners.

6A-85. Corrosion Research in the Navy. Julius J. Harwood and Fred Schulman. *Corrosion,* v. 5, July 1949, p. 203-217.
Types of corrosion, methods of control, passivity and film formation, inhibitors and passivators, and high-temperature oxidation. 18 ref.

6A-86. High Temperature Corrosion of Metals. Andrew Dravnieks and Hugh J. McDonald. *Corrosion,* v. 5, July 1949, p. 227-233.
Problems of chemical attack by gases. Characteristics which play an important role include volatility of reaction products, adherence of scale to metal, relative thermal expansion and specific volume of metal scale. Other developments include effects of pressure, rate of flow, presence of foreign substances in the gas phase, surface conditions of the metal, and variations in temperature on the corrosion reaction. 52 ref.

6B—Ferrous

6B-101. Pipe Corrosion Mitigation Practices. A. H. Cramer. *American Gas Association, Proceedings,* 1948, p. 697-703.
Underground pipe-protection practices in urban and suburban areas. Field use of the Pearson Pipe Coating Fault Locator.

6B-102. Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials,* Preprint 3, 1949, 19 pages.
An extended tabulation of data obtained during the past year from field tests of wire and wire products at eight widely scattered industrial, seacoast, and rural locations.

6B-103. Report of Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel, and Related Alloys. *American Society for Testing Materials,* Preprint 7, 1949, 8 pages.
Recommendations plus report of special committee on inspection of stainless-steel architectural structures to determine corrosion resistance in service.

6B-104. Results of Some Plant Corrosion Tests of Welded Stainless Steels. George F. Comstock. *American Society for Testing Materials,* Preprint 23, 1949, 10 pages.
Tests were made in a number of chemical plants under operating conditions, and results compared with those obtained by the boiling-HNO_3 procedure in the laboratory. The specimens included types 304, 321, and 347 sheets, welded with types 308, 321, and 347 electrodes, respectively, and tested both in the as-welded and stress-relieved conditions. Results show no correlation between the HNO_3 test and the plant tests.

6B-105. Electrochemical Studies on Insulating Couplings for Underground Pipe and Cable Lines. W. Beck. *Corrosion,* v. 5, June 1949, p. 175-181.
Resistance measurements were carried out on a number of the above immersed for about a year in tap water and under a constant polarizing emf. Application in connection with surface insulation, which is recommended to subdue stray current and cathodic corrosion. 16 ref.

6B-106. Corrosion Problems in a Fluid Catalytic Cracking and Fractionating Unit. Nathan Schofer. *Corrosion,* v. 5, June 1949, p. 182-188.
With particular reference to hydrogen blistering.

6B-107. Rectifiers and Galvanic Anodes for Cathodic Protection. A. L. Stegner. *Pipe Line News,* June 1949, p. 18-19, 22-23.
Two types of protection as applied to buried metallic structures, and their advantages and disadvantages under various circumstances.

6B-108. Boiler Water Conditioning and Chemical Cleaning of Boilers. S. S. Tomkins. *American Gas Association, Proceedings,* 1948, p. 488-504.
Use to prevent adherent solid deposits; corrosion, embrittlement, or other surface deterioration; and foaming or priming. Control measures include degasification and chemical treatment of feed water; removal of insoluble solids and excess soluble compounds from boiler; and separating water from steam.

6B-109. Complete Corrosion Tests on Iron and Steel Pipes. G. A. Ellinger, L. J. Waldron, and S. B. Marzolf. *Industry and Power,* v. 57, July 1949, p. 91-92.
Investigations that have extended over a period of 10 years on the relationship of pit depths and weight losses in pipes exposed to continuous water flow. Various steels, wrought irons, and cast irons were studied.

6B-110. Recent Research on Caustic Cracking in Boilers. C. D. Weir. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 92, Jan. 1949, p. 165-191; discussion, p. 191-192, also Feb. 1949, p. 193-205.
Characteristics of caustic cracking; influence of feed water; apparatus and methods for caustic-cracking research; factors tending to stimulate and to inhibit caustic cracking; and theories of caustic cracking. 40 ref.

6B-111. Field and Laboratory Tests of Sodium Chromates and Alkalies for Controlling Corrosion in Gas Condensate Wells. Part 1. The Problem and a Résumé of Results Obtained. C. R. Eilerts, R. V. Smith, F. G. Archer, L. M. Burman, Faye Greene, and H. C. Hamontre. *World Oil,* v. 129, July 1949, p. 142-144, 146, 148, 150.
First of a series of six articles describing work done by the Bureau of Mines in East Texas and North-east Louisiana fields and in the laboratory.

6B-112. Modern Protection Methods for Cast Iron and Steel Pipes and the Experience Gained in the Netherlands. J. E. Carriere. *Gas Times,* v. 59, June 24, 1949, p. 478-480.
Summarizes a discussion by various men.

6B-113. Special Anodes for the Cathodic Protection of Water Tanks. A. L. Kimmel. *Corrosion,* v. 5, July 1949, p. 217-220.
Mechanism for film formation. Experimental work and results.

6B-114. The Role of Adsorption From Solution in Corrosion Inhibitor Action. Norman Hackerman and Harold R. Schmidt. *Corrosion,* v. 5, July 1949, p. 237-243.
A generalized theory for the mechanism of organic corrosion inhibitors. In experimental investigations, adsorption isotherms were run at 40° C. for stearic acid, stearyl alcohol, succinimide, dibutyl thiourea, and p-aminobiphenyl, using two different methods. 22 ref.

6B-115. New Aspects of Rustproofing. Arthur Minich. *Paint and Varnish Production Manager,* v. 29, July 1949, p. 185-190.
Previously abstracted from *Paint, Oil and Chemical Review.* See item 6B-69, 1949.

6C—Nonferrous

6C-44. The Solution of Gold by Selenic Acid. William E. Caldwell and Lowell P. Eddy. *Journal of the American Chemical Society,* v. 71, June 1949, p. 2247.
Action of 87 and 97% solutions at 130° C.

6C-45. Bearing Corrosion Test for Lubricating Oils; Correlation With Engine Performance. E. C. Hughes, J. D. Bartleson, and M. L. Sunday. *Analytical Chemistry,* v. 21, June 1949, p. 737-743.
Describes thrust-bearing apparatus adaptable to the Sohio oxidation test. Operating conditions and catalyst components have been determined so that the test at 10 hours correlates for Cu-Pb corrosion with the 36-hour, L-4 Chevrolet test for varied groups of inhibitors and oils. The test is shown to be correlative for 76 oil-inhibitor combinations comprising four inhibitor types and two commercial oils. 14 ref.

6C-46. Destruction of an Admiralty Tube Bundle by Stress Corrosion in the Presence of Mercury. B. B. Morton. *Corrosion,* v. 5, July 1949, p. 244.

6D—Light Metals

6D-23. Surface Treatment and Finishing of Light Metals. Part 2. Corrosion and Protection of Aluminium and Its Alloys. S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 26, June 1949, p. 1289-1296.
Corrosion-test procedures and various methods for prevention of corrosion. Comparative test data for various protective films. 153 ref.

6D-24. Corrosion Characteristics of Light Metals Used in Sprinkler Irrigation Systems. *Light Metal Age,* v. 7, June 1949, p. 14-15, 23.
Results of an investigation at the State College of Washington.

For additional annotations indexed in other sections, see:

3B-150; 7B-119; 8-187; 23A-17; 23D-60

7A—General

7A-82. The Motor-Car v. the Weather. H. Silman. *Journal of the Electrodepositors' Technical Society,* v. 23, 1947-48, p. 121-136; discussion, p. 136-138.

Various methods of protecting different motor car parts from corrosion, which include plated surfaces, phosphate coatings, and organic finishes.

7A-83. Report of Committee D-1 on Paint, Varnish, Lacquer, and Related Products. *American Society for Testing Materials,* Preprint 51, 1949, 41 pages.

Proposals for changes in specifications and test methods. Measurement of dry film thickness of above type of product; exterior exposure tests of paint on wood and steel; testing bituminous emulsions as metal coatings; and other material of particular interest to the paint industry.

7A-84. Interferenzschichten (einschliesslich Korrosionsschutzschichten) auf Metallspiegeln. (Interference Films (Including Corrosion-Preventive Films) on Metal Mirrors.) K. Steinbuch. *Zeitschrift fur Angewandte Physik,* v. 1, Jan. 20, 1949, p. 256-260.

A theoretical, mathematical discussion showing that the reflecting power of metal mirrors can be greatly increased by interference films. Conditions for any given film thickness and wave length, and how the final formula can be derived by two different methods. Dimensions of anti-corrosion films that will increase rather than reduce the reflecting power.

7A-85. Herstellung dunner Metall und Salzschichten durch Aufdampfen in Vakuum. (Production of Thin Films of Metals and Salts by Vacuum Vapor Deposition.) Karl Rohn. *Zeitschrift fur Physik,* v. 126, Apr. 4, 1949, p. 20-26.

For a thin film of LiF, the close agreement of a vapor-deposited layer of salt with the layer of salt we would expect from the straight-line path of the molecules between the small vaporizing furnace and the target.

7A-86. Cellulose Acetate Plastics. XXI. Printing and Decorative Finishing. Vivian Stannett. *Plastics* (London), v. 13, May 1949, p. 261-265.

Conventional printing; silk-screen printing; stamping; etching; embossing; metal plating; vacuum deposition; and metal inlays. 28 ref. (To be continued.)

7A-87. Evaluation of Porcelain-Enamel Texture by a Plastic-Replica Technique. *Better Enameling,* v. 20, June 1949, p. 8-11. Based on paper of same title by J. C. Richmond and A. C. Francisco, *Journal of the American Ceramic Society,* v. 32, May 1, 1949, p. 170-179.

Previously abstracted from original, item 7A-71, 1949.

7A-88. Some Comments on the Cleaning of Sheet-Metal Pressings Prior to Enamelling. P. G. Patten. *Sheet Metal Industries,* v. 26, June 1949, p. 1297-1301.

Recommended procedures, both mechanical and chemical, and solutions for the latter.

7A-89. Vapor-Phase Deposition of Refractory Metals. *Iron Age,* v. 163, June 16, 1949, p. 98-100. Condensed from "The Vapor-Phase Deposition of Refractory Materials," by I. E. Campbell, C. F. Powell, D. H. Nowicki, and B. W. Gonser.

Present state of development and commercial applications. Vapor-deposited refractory coatings and their properties. The metals themselves; and their carbides, nitrides, borides, silicides, and oxides.

7A-90. Acid Pretreatment of Porcelain Enamel. *Iron Age,* v. 163, June 16, 1949, p. 100.

Effects on acid and abrasion resistance as discussed in a recent report of National Bureau of Standards.

7A-91. Polishing: Recommended Procedures for Ferrous and Non-Ferrous Metals. Recommended Methods for Aluminium, Silver and Electroplates. G. F. Weill. *Metal Industry,* v. 74, May 20, 1949, p. 407-409; June 3, 1949, p. 442-444.

Mechanical methods and selection of abrasives. Detailed recommendations for each of the common types. Special procedures necessary for Al and its alloys.

7A-92. Metal Spray Coatings for Metals and Plastics. David Brownlie. *Canadian Metals and Metallurgical Industries,* v. 12, June 1949, p. 27-28.

Equipment, procedures, and applications.

7A-93. Production Painting of Metal Signs. Kenton S. Donaldson. *Industrial Finishing,* v. 25, June 1949, p. 24-25, 27-28, 30.

Use of screen process.

7A-94. Reproducing Wood Grain Rapidly. W. Nelson White. *Industrial Finishing,* v. 25, June 1949, p. 50-52, 54.

How reproduction of natural wood grain on plain surfaces, by use of an etched copper plate and inking roller, is speeded by use of an automatic power machine.

7A-95. Finishing Metal Caskets. Joseph Blaser. *Industrial Finishing,* v. 25, June 1949, p. 55-56.

Cleaning and finishing methods used at one plant.

7A-96. 4-Color Silk Screen Process Reproduction. Michael Elukevich. *Industrial Finishing,* v. 25, June 1949, p. 60, 62, 64.

Screen-printing stencils are made from enlarged photographs of a 4-color painting and are used to make perfect four-color reproductions on advertising signs.

7A-97. Coating Small Hardware With Lacquer. Fred Rossberg. *Industrial Finishing,* v. 25, June 1949, p. 66-67, 71.

How brass, bronze, steel, and iron hardware parts are cleaned and coated with lacquer in modern dip-whirl coating machines.

7A-98. Coating Record-Player Turntables With Flock. H. F. Thiele, Jr., and E. G. Koriath. *Industrial Finishing,* v. 25, June 1949, p. 72, 74.

Procedures and equipment.

7A-99. Protecting Fixtures and Patterns in Open Storage. Howard N. Smith. *Iron Age,* v. 163, June 30, 1949, p. 55-57.

Use of strippable plastic coatings. Methods of application and economics.

7A-100. Metal Surfaces. Their Preparation and Painting. (In English.) G. Diehlman, A. J. Eickhoff, and J. G. Wills. "Premier Congres Technique International de l'Industrie des Peintures et des Industries Associées," 1948 (André Tournon et Cie., Paris), p. 265-270.

Surface preparation and painting of iron, galvanized iron, and aluminum from both the mechanical and chemical viewpoints. Effect on performance of paint applied over pickled, intact mill scale, and corroded steel surfaces; laboratory test to indicate surface wetting ability of oil and varnish vehicles applied to rusted steel; practical test showing correlation between wetting ability of oil and varnish vehicles and paint performance on partially corroded steel; graphical analysis of paint-surface wetting characteristics vs. metal protection; and the role of chemical pretreatments in providing adequate adhesion of paint coatings on aluminum and galvanized steel surfaces. 13 ref.

7A-101. Adesivita' di Film di Vernici su Superfici di Vetro e di Metalli. (Adhesivity of Varnish Films to Glass and Metal Surfaces.) A. G. Nasini and V. Rava. "Premier Congres Technique International de l'Industrie des Peintures et des Industries Associées," 1948 (André Tournon et Cie., Paris), p. 309-313.

Improved method for determining the above. Comparative values of adhesivity of standoil-base and phenolic-resin-base varnishes at drying temperatures of 140 and 180° C., the latter giving approximately double the adhesivity of the former. Principal sources of error and limitations, and potentialities for use in study of the physical chemistry of surfaces.

7A-102. Industrial Finishes and Finishing. (In English.) F. G. Weed and N. P. Beckwith. "Premier Congres Technique International de l'Industrie des Peintures et des Industries Associées," 1948 (André Tournon et Cie., Paris), p. 625-635.

Finishing materials and their application as protective and decorative coatings on automobiles and other industrial products. Surface preparation requirements and procedures. Application procedures, particularly electrostatic deposition. Methods of baking organic finishes, with emphasis on infrared ovens.

7A-103. New Way of Preventing Corrosion. Trevor Williams. *Canadian Chemistry and Process Industries,* v. 33, June 1949, p. 536.

Rubber latex, containing sodium benzoate, when sprayed on metal surfaces is said to have excellent corrosion resistant properties.

7A-104. How to Select Superfinishing Abrasives. E. L. Hemingway. *American Machinist,* v. 93, July 14, 1949, p. 101-104.

The bearing of the size of grit, hardness of bond, pressure, work speed, lubricant, and material and abrasive hardness on quality of finish.

7A-105. Les dépots d'acier par projection et l'aciération de l'aluminium. (Deposits of Steel Produced by Projection; and Steel Coating of Aluminum.) Jacques Cauchetier. *Revue de l'Aluminium,* v. 26, May 1949, p. 171-172.

The physical and mechanical properties of steel deposits on Al, Mg, and their alloys, produced by projection (the powder pistol). The metallization process, surface preparation, machining, and abrasion characteristics of the deposit.

7A-106. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 13, July 1949, p. 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76.

Discusses finishes for steel products, porosity tests for electroplated coatings, recent developments in paint removers, chromate gelatine films on aluminum, and primers for light metals.

7A-107. Production Clinic for Finishing Die Castings. *Die Castings,* v. 7, July 1949, p. 38, 40-42.

Stress in electroplated coatings and improving alkyd organic-finishing materials.

7A-108. Principles of Writing Specifications for Metal Protective Paints. W. W. Cranmer. *Corrosion,* v. 5, July 1949, p. 234-236.

Reviews and criticizes previously published paint specifications. Shows how to provide a concise, definite, and complete statement of requirements. 10 ref.

7A-109. Evaluation of Porcelain Enamel Texture by a Plastic-Replica Technique. J. C. Richmond and A. C. Francisco. *Finish,* v. 6, July 1949, p. 25-27, 48.

Previously abstracted from *Journal of the American Ceramic Society.* See item 7A-71, 1949.

7A-110. Precision Tumbling. *Tool & Die Journal,* v. 15, July 1949, p. 66.

Procedure uses specially prepared abrasives, and can be applied to a wide variety of miscellaneous parts.

7A-111. Tank Linings and Insulating Materials. V. Evans. *Journal of the Electrodepositors' Technical Society,* v. 24, 1949, p. 129-143. (Preprint.)

Principal materials used to deal with corrosive conditions such as those found in pickling and plating operations. Insulating methods for rack and jig coatings. Emphasis is placed on recent methods of lining, including use of plastics. 12 ref.

7A-112. (Book) **Premier Congres Technique International de l'Industrie des Peintures et des Industries Associées.** (First International Congress of the Paint and Associated Industries.) 650 pages. 1948. André Tournon et Cie., 20 rue Delambre, Paris 6, France.

All but the first 54 pages are devoted to the 101 papers presented at the above conference, held in Paris, Oct. 1-6, 1947. A wide variety of fundamental and practical topics is discussed. Includes several papers directly connected with metal coating and surface preparation. These are abstracted separately.

7B—Ferrous

7B-117. Effects of Acid Treatment on Abrasion and Acid Resistance of Porcelain Enamels. W. N. Harrison, J. C. Richmond, and J. R. Crandall. *Better Enameling,* v. 20, June 1949, p. 18-19.

Recent work at National Bureau of Standards. The most significant finding was that treatment with acetic acid, which produced only minor visible attack, strongly inhibited further attack on subsequent treatment with citric acid, although this acid severely attacked untreated areas of the same specimens.

7B-118. Trouble Shootin'. John L. McLaughlin. *Better Enameling,* v. 20, June 1949, p. 33.

Defects of porcelain enameling known as beading along flanges, cracking, and black specking.

7B-119. Methods for Prevention of Rust in Water Tanks; A Preliminary Report. Fred Schumann. *Corrosion,* v. 5, June 1949, p. 198-200.

Analyzes corrosion, and discusses electrolytic protection. Proposes a combination of protective coating and electrolytic methods.

7B-120. Protection for Ship Hulls. L. M. Mosher. *Corrosion,* v. 5, June 1949, p. 201.

Surface preparation, initial costs, and use of antifouling paint.

7B-121. Metallizing in Relation to Marine Engineering. J. Barrington Stiles. *Welding Journal,* v. 28, June 1949, p. 541-558.

Equipment used to spray metal, characteristics of the coating, methods of bonding to base material, and techniques for finishing coatings.

7B-122. Electrochemical Studies of Protective Coatings on Metals. Part I. Electrode Potential Measurements on Painted Steel. F. Wormwell and D. M. Brasher. *Journal of the Iron and Steel Institute,* v. 162, June 1949, p. 129-135.

Experimental technique for measuring changes of electrode potential of painted steel immersed in artificial seawater. By continuing observations over longer periods than previously used, the measurements can be closely correlated with rate of breakdown estimated visually and also by determinations of weight loss. The technique was used to investigate effects of various factors. 15 ref.

7B-123. Continuous Steel Strip Pickling. R. W. Treasure. *Journal of the Iron and Steel Institute,* v. 162, June 1949, p. 201-212.

Principles of construction and operation of the modern continuous-strip pickle line. History of its development, and results of investigation of the removal of mill scale by the use of sulfuric acid. Electrolytic pickling, and the semi-continuous type of pickler and the rotary-coil pickle line. Processing of stainless steel with the aid of caustic soda is dealt with. Constructional and operational aspects of the continuous wide-strip pickle line.

7B-124. The Outlook for Steel. Robert M. Nelson. *Sheet Metal Worker,* v. 40, June 1949, p. 49-50, 82.

Economic trends as well as new developments in manufacture and finishing of sheet steel, with emphasis on the Armco "Zincgrip" process for hot-dip coating.

7B-125. The Studebaker Truck Finish. J. M. Gauss. *Industrial Finishing,* v. 25, May 1949, p. 50-52, 54, 56, 58.

Procedures and equipment for application and baking. (To be continued.)

7B-126. Clad Steel; Manufacture, Treatment and Uses. F. R. Pattison. *Iron and Steel,* v. 22, June 1949, p. 284-288.

Methods for producing homogeneously and nonhomogeneously bonded plates which include casting, intermelting, use of heat and pressure, and welding. Advantages and applications.

7B-127. Hard Surfacing for Increased Wear Resistance. Gilbert P. Muir. *Tool Engineer,* v. 22, June 1949, p. 30-31.

Preparation of part, preheating, hard facing procedure, and application to alloy steels. Characteristics of materials used.

7B-128. Engineered Instrumentation Makes Quality Control of Tin Plate Production Effective. Harry C. Morrow. *Steel,* v. 124, June 20, 1949, p. 120, 123-124, 126, 129.

Methods and equipment for control and recording of different variables.

7B-129. Prufung der Gleichmässigkeit von Zinkuberzugen auf Stahldrähten durch Tauchen in Kupfersulfatlösung. (Determining Uniformity of Zinc Coatings on Steel Wires by Dipping Them Into Copper Sulfate Solutions.) Hubert Hoff and Georg von der Dunk. *Archiv fur das Eisenhuttenwesen,* v. 20, Mar.-Apr. 1949, p. 135-138.

Evaluates the accuracy of the above method, showing that it fails to furnish definite conclusions on the corrosion resistance of the material under natural conditions. 16 ref.

7B-130. New Torch Licks Problem of Flame-Spraying Polythene. W. B. De Long and E. V. Peterson. *Chemical Engineering,* v. 56, June 1949, p. 123-125.

Torch and procedure for application to steel. Corrosion-test results which show that the coatings are nonporous, adherent, and corrosion resistant, in contrast to those applied by other methods.

7B-131. The Studebaker Truck Finish. Part II. J. M. Gauss. *Industrial Finishing,* v. 25, June 1949, p. 32, 37-38.

Surface preparation, painting, and paint-curing operations on automotive hoods, fenders, chassis, and wheels.

7B-132. Modern Instrumentation for Measuring Temperature Gradients in Continuous Porcelain Enameling Furnaces. M. Bozsin and C. A. Vana. *American Ceramic Society Bulletin,* v. 28, June 15, 1949, p. 219-223.

A portable insulated box containing a three-point electronic temperature recorder developed to travel through enameling furnaces heated to 1600° F. Records temperature gradient simultaneously at three levels under normal firing conditions.

7B-133. Mottled Enameled Finishes Obtained by Precipitation of Various Color-Producing Salts. George Sirovy and Edmund P. Czolgos. *American Ceramic Society Bulletin,* v. 28, June 15, 1949, p. 223-224.

Procedure for producing finishes resembling marble, in sheet-steel cover-coat enamels.

7B-134. The Mechanism of Protection by Paints. (In English.) J. E. O. Mayne. "Premier Congres Technique International de l'Industrie des Peintures et des Industries Associées," 1948 (André Tournon et Cie., Paris), p. 261-264; discussion, p. 264.

As applied to protection of iron and steel. 14 ref.

7B-135. Préparation des Toles d'Acier par Phosphatation avant Peinture. (Preparation of Steel Sheets for Painting by Phosphating.) Jean Bary. "Premier Congres Technique International de l'Industrie des Peintures et des Industries Associées," 1948 (André Tournon et Cie., Paris), p. 276-277.

Use of accelerators; the course of the reaction and its mechanism; thickness of the surface layer; optimum conditions of operation; and principal applications.

7B-136. L'Influence de la préparation des surfaces sur la tenue des peintures au brai de houille. (Influence of Surface Treatment on the Adhesion of Coal-Tar-Base Paints.) Albin Marty. "Premier Congres Technique International de l'Industrie des Peintures et des Industries Associées," 1948 (André Tournon et Cie., Paris), p. 593-599.

A study of different paints of the above type used for coating of ferrous metals, mostly as protection against corrosion. Thorough investigation indicated that preliminary, careful surface treatment, particularly cold phosphating, greatly improves the adhesion of the paint and increases the duration of effective corrosion resistance.

7B-137. Tank Coatings. (In English.)

John C. Moore. "Premier Congres Technique International de l'Industrie des Peintures et des Industries Associées," 1948 (André Tournon et Cie., Paris), p. 636-637.
Materials used for protecting the interiors of steel tanks containing petroleum products.

7B-138. Flame Spraying of Metals and Plastics in Engineering and Shipbuilding. F. A. Rivett. *Transactions of the Institution of Engineers & Shipbuilders in Scotland*, v. 92, May 1949, p. 331-342; discussion, p. 342-354.
Development of metal-spraying guns; applications of flame spraying; use of zinc spraying to prevent marine corrosion; spraying of other metals; flame spraying of plastics.

7B-139. Zur Bedeutung des Stickstoffs im Eisen fur die Feuerverzinkung. (The Significance of the Nitrogen Content of Galvanizing Iron.) Heinz Bablik, Franz Götzl, and Rudolf Kukaczka. *Zeitschrift fur Metallkunde*, v. 40, Apr. 1949, p. 141-147.
The effect of nitriding on the adherence and bending strength of galvanized zinc coatings was investigated. Results indicate that nitriding may result in improvement of adherence of the coating. A constitution diagram shows the Fe-N system between 0 and 8% N. Photomicrographs show structures of the deposits, the Zn-Fe bonds and the underlying base metal.

7B-140. Electrolytic Pickling for Galvanizing and Terne Lines. E. A. Matteson. *Products Finishing*, v. 13, July 1949, p. 42, 44, 46.
Procedure used by the Carnegie-Illinois Steel Corp., Gary, Ind.

7B-141. Development of Pipe Line Coatings and Mechanical Application Methods. Stephen D. Day. *Corrosion*, v. 5, July 1949, p. 221-226.
History of the development and successful application of pipe coatings. Coal-tar enamels, asphalts, petroleum compounds, and application methods.

7B-142. Chemical Rust Remover; German Development of a Non-Destructive Process. *Chemical Age*, v. 60, June 18, 1949, p. 890.
Three separate methods: dipping articles, application of a paste, and a method for larger surfaces which converts rust into a protective covering.

7B-143. Nickel Dip Practice and Control for Porcelain Enameling. Norman H. Stolte. *Finish*, v. 6, July 1949, p. 24, 46, 48.
Recommended procedures on the basis of a brief literature review. Includes methods for determination of nickel coatings on enameling iron.

7C—Nonferrous

7C-28. Extending the Life of Tungsten Carbide Form Tools. Charles A. McQuarrie. *Tool Engineer*, v. 22, June 1949, p. 23.
Methods and material for tools used on Al and Mg alloys. Using a wooden wheel with a paste of diamond dust, the edge surfaces of the tool are burnished to a mirror finish. Wood permits surface refinement without the usual attention to spindle accuracy or wheel concentricity.

7C-29. Automatic Buffing of Plated Hub Caps. A. H. Allen. *Steel*, v. 124, June 27, 1949, p. 62-64.
Completely automatic setup.

7C-30. A Brief History of Tin Plate. Samuel S. Johnston. *Plating*, v. 36, July 1949, p. 711.
Developments since 1240.

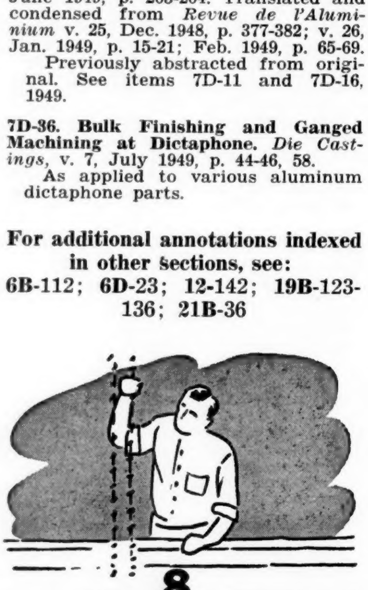
7D—Light Metals

7D-34. La Préparation de l'Aluminium et de ses Alliages avant Peinture. (Preparation of Aluminum and Its Alloys Before Painting.) Jean Frasch. "Premier Congres Technique International de l'Industrie des Peintures et des Industries Associées," 1948 (André Tournon et Cie., Paris), p. 271-275.
The surface treatment recommended consists in a very careful degreasing-cleaning procedure followed by passivation of the metallic surface. Proposes use of "Framanol" and "Framalite," chemical compositions of which are given. Optimum conditions are indicated.

7D-35. Barrel Burnishing of Light Alloy Products. Ch. Etienne. *Engineers' Digest*, v. 10, May 1949, p. 172-174; June 1949, p. 203-204. Translated and condensed from *Revue de l'Aluminium* v. 25, Dec. 1948, p. 377-382; v. 26, Jan. 1949, p. 15-21; Feb. 1949, p. 65-69.
Previously abstracted from original. See items 7D-11 and 7D-16, 1949.

7D-36. Bulk Finishing and Ganged Machining at Dictaphone. *Die Castings*, v. 7, July 1949, p. 44-46, 58.
As applied to various aluminum dictaphone parts.

For additional annotations indexed in other sections, see:
6B-112; 6D-23; 12-142; 19B-123-136; 21B-36



8 ELECTRODEPOSITION and ELECTROFINISHING

8-181. The Production of Electro-Formed Moulds for Plastics and Die Casting. P. Spiro. *Journal of the Electrodepositors' Technical Society*, v. 23, 1947-48, p. 13-32.
Process based on accurate machining of a plastics master giving it a high degree of finish. A shell of hard Ni is electroformed on the master. Shell is given a mirror finish, then mounted in a steel bolster. Problems involved and applications. 11 ref.

8-182. The Lead Plating of Bronze Bearing Surfaces for High Pressure Fuel Pumps. H. Silman and M. F. E. Fry. *Journal of the Electrodepositors' Technical Society*, v. 23, 1947-48, p. 43-52; discussion, p. 53-58.
Procedure for increasing life of the Al-bronze rotor of a fuel pump for gas-turbine engines.

8-183. Notes on Bright Silver Plating. E. W. Wilson. *Journal of the Electrodepositors' Technical Society*, v. 23, 1947-48, p. 139-142.
Previously abstracted from condensed version in *Electroplating and Metal Finishing*, item 8-5, 1949.

8-184. Electrodeposition of Speculum. J. W. Cuthbertson. *Journal of the Electrodepositors' Technical Society*, v. 23, 1947-48, p. 143-150.
Speculum, an alloy of tin and copper, is employed primarily as a decorative finish. Procedure and improvements in process first introduced some ten years ago.

8-185. Practical Aspects of Speculum Plating. W. H. Sawyer. *Journal of the Electrodepositors' Technical Society*, v. 23, 1947-48, p. 151-162.
In relation to normal plating-shop routine.

8-186. Electrodeposition in the Printing Industry. P. B. Upton. *Journal of the Electrodepositors' Technical Society*, v. 24, 1949, p. 95-110. (Preprint.)
Reviews all aspects of the above.

8-187. Report of Committee B-8 on Electrodeposited Metallic Coatings. *American Society for Testing Materials*, Preprint 15, 1949, 30 pages.
Proposals for changes in specifications and tests; as well as research reports on atmospheric exposure of electroplated lead coatings on steel and atmospheric exposure of Cu-Ni-Cr deposits on high-carbon steel. Method for preparation of high-carbon steel for electroplating.

8-188. The Purification of Plating Solutions. Part II. Nickel Solutions. G. T. Colegate. *Electroplating and Metal Finishing*, v. 2, May 1949, p. 307-315.
Methods for removal of metallic and organic impurities and suitability of each. (To be concluded.)

8-189. Modern Trends in Bright Nickel Plating; Description of a New Cobalt-Free Solution. *Sheet Metal Industries*, v. 26, June 1949, p. 1302-1304.
New British bright-nickel solution known as "Gleamax," and its use.

8-190. Plating Easily Buffed Nickel: the Perflow Process. T. S. Blair. *Iron Age*, v. 163, June 16, 1949, p. 86-89.
Process deposits a soft semibright nickel that fills in surface irregularities during plating and color buffs easily. It has provided substantial savings and increased production in the plating department of the plant described. Surface preparation is less critical, plating time has been reduced, and buffing capacity has been stepped up 25%.

8-191. Hard Chrome Plating Milling Machine Quills. Warren Schmidt. *Iron Age*, v. 163, June 16, 1949, p. 96-97.
Complete cost breakdown, enabling determination of a cost per sq. in. figure, and a description of the plating process, which is typical of applications to rebuilding of worn machine parts.

8-192. Notes on the Temperature Control of Steam Heated Plating Plant. *Electroplating and Metal Finishing*, v. 2, June 1949, p. 377-385.
Arrangements for control of bath temperatures.

8-193. The Purification of Plating Solutions. Part III. Conclusion. G. T. Colegate. *Electroplating and Metal Finishing*, v. 2, June 1949, p. 417-423, 425-426.
Copper, brass, speculum plating, zinc, cadmium, tin, silver, chromium, gold, and rhodium solutions.

8-194. Aggressive Aluminum Plating Plant. *Modern Metals*, v. 5, June 1949, p. 35-37.
Plant engaged in custom anodizing of aluminum products for various manufacturers.

8-195. Electropolishing Brass. Willard G. Axtell. *Iron Age*, v. 163, June 30, 1949, p. 48-51.
Bath and process applicable to brass and other copper alloys as well as to certain high-temperature alloys. Addition of organics to the bath, to promote anodic-film formation, has proved to be the key to successful results. A simple and

effective method for evaluating the reflective power of polished articles.

8-196. Electrodeposition of Rhenium From Aqueous Solutions. L. E. Netherton and M. L. Holt. *Journal of the Electrochemical Society,* v. 95, June 1949, p. 324-328.

Emphasis on semi-quantitative information about cathode current efficiencies.

8-197. Sur le polissage électrolytique de l'uranium en vue des études physico-chimiques et métallographiques. (Electrolytic Polishing of Uranium for the Purpose of Physicochemical and Metallographic Study.) Pierre A. Jacquet and Roger Caillat. *Comptes Rendus* (France), v. 228, Apr. 4, 1949, p. 1224-1226.

The method, electrolyte, and optimum conditions. The surface of uranium retains its brilliancy in a dry atmosphere after electrolytic polishing, but is coated with a yellowish film (UH_3) when subjected to an ordinary atmosphere.

8-198. Automatic Plating Control. Bath Operation at Constant Current Density. D. Ashby. *Metal Industry,* v. 74, June 17, 1949, p. 483-485.

Important developments in the automatic control of rectifiers for operating a bath at constant current density, regardless of the area of work. Automatic control equipment for chromic acid anodizing was developed.

8-199. Plating of Pressed Metal Powder Parts. A Preliminary Study. A. K. Graham, H. L. Pinkerton, E. A. Anderson, and C. E. Reinhard. *Plating,* v. 36, July 1949, p. 702-709.

Principal difficulties to be expected and general procedures for overcoming them. Points of principal importance are drag-over, finish perfection, mechanical preparation, spotting-out, and outdoor service.

8-200. Electrolytic Tin Plate. *Plating,* v. 36, July 1949, p. 712-716.

Procedure and equipment at the Weirton Steel Co.

8-201. Production Plating of Die Cast Automotive Trim. Ezra A. Blount. *Products Finishing,* v. 13, July 1949, p. 14-22, 24.

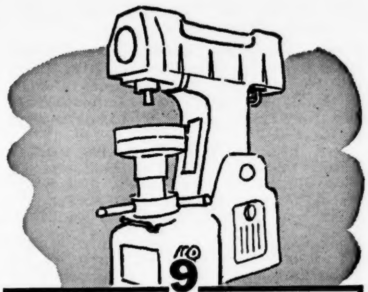
Procedure at the Electric Auto-Lite Co., Lockland, Ohio.

8-202. Amperometric Determination of Sulfates in Nickel-Plating Baths. (In Russian.) V. F. Toropova, E. A. Zimkin, and A. A. Popel. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 404-407.

Two methods for determining SO_4 ions in the presence of Cl ions are proposed: precipitation of Cl by $AgNO_3$, followed by titration of SO_4 in the presence of AgCl; and formation of a Pb acetate complex which impedes precipitation of $PbCl_2$.

For additional annotations indexed in other sections, see:

7A-86-106; 7C-30; 11-240; 15-50-52; 19B-123



9 PHYSICAL and MECHANICAL TESTING

9-177. The Time Delay for the Initiation of Plastic Deformation at Rapidly Applied Constant Stress. D. S. Clark and D. S. Wood. *American Society for Testing Materials,* Preprint 25, 1949, 19 pages.

Design and construction of a special rapid-load testing machine with which tensile loads may be applied for 5 millisec. and longer. Tests made on an annealed low-carbon steel. Definite time delay is required for the initiation of plastic deformation in this material and this delay depends upon applied stress. Experimental results on five materials for which the stress-strain curve does not exhibit a definite yield point.

9-178. A Standard Method of Determining Stresses in Glass-to-Metal Seals of the Sandwich and Bead Types. *Journal of the Society of Glass Technology,* v. 33 (Transactions Section), Feb. 1949, p. 77-81.

Photo-elastic method.

9-179. A Report of Some Recent Research Into the Measurement and Relaxation of Residual Stresses. W. Soete. *Sheet Metal Industries,* v. 26, June 1949, p. 1269-1280.

Classifies residual stresses as reaction, macroscopic, and microscopic types. The macroscopic stresses are dealt with. Method developed for measuring them in which resistance strain gages are placed in star form about a small hole drilled in the material being investigated. Nature of residual stresses and possible methods for their relief, including low temperature and mechanical methods. Results of experiments. 23 ref.

9-180. A Mechanical Test to Measure the Workability of Wire. Walston Chubb, Jr., and D. S. Eppelsheimer. *Wire and Wire Products,* v. 24, June 1949, p. 491-493, 545-546.

Transverse crimp-sensitivity test which is essentially a refinement of the bend test for ductile materials. It has been found to be capable of detecting very small differences in workability or stiffness; it will detect differences in hardness of hard-drawn wire and in heat treatment of annealed wire, as well as all defects which affect workability.

9-181. Static vs. Dynamic Test Methods. John N. Kenyon. *Wire and Wire Products,* v. 24, June 1949, p. 498, 500, 525-527.

Machines of the two types as used for testing of wire. Features of specific machines of each type.

9-182. Slow-Motion Pictures of Impact Tests by Means of Photoelasticity. Ludwig Foeppl. *Journal of Applied Mechanics,* v. 16 *(Transactions of the American Society of Mechanical Engineers,* v. 71), June 1949, p. 173-177.

Resulted in verification of the classical theory of St. Venant and Flamant. Details of two of the tests: one in which impact was of moderate intensity, so that response was entirely elastic; and one in which impact was strong enough to break the test bar.

9-183. Correlation of Tension Creep Tests With Relaxation Tests. Irving Roberts. *Journal of Applied Mechanics,* v. 16 *(Transactions of the American Society of Mechanical Engineers,* v. 71), June 1949, p. 208.

Analytical solutions to the bolt relaxation problem, based upon empirical creep-data equations, may be obtained by direct substitution, rather than by differentiation and integration, as was done by Soderberg, Popov, and Housner.

9-184. Hardness Indenter Sockets. *Industrial Diamond Review,* new ser., v. 9, May 1949, p. 147.

Dimensions of holder or socket for a number of important hardness testers.

9-185. An Experimental Investigation by a Dynamical Method of the Variation of Young's Modulus with Temperature. G. E. Bennett and R. M. Davies. *Journal of the Institute of Metals,* v. 75, May 1949, p. 759-776.

Method in which the specimen, in the form of a fixed-free bar about 2.5 cm. long, is maintained in transverse vibration by the action of superimposed steady and alternating magnetic fields. Resonance is detected by a phonograph pickup whose output is amplified, rectified, and applied to a galvanometer. Young's modulus-temperature curves are given for commercial brass; Cu; mild steel; Fe; Ni; Co; Monel; 44%-Ni, 56%-Cu alloy; 48%-Ni, 52%-Fe alloy; β-brass; and a Cu-Au alloy. Results are compared with those of previous investigators. 22 ref.

9-186. Methods of Speed Control for Testing Machines. Lawrence K. Hyde. *Instruments,* v. 22, June 1949, p. 495-497.

Previously abstracted from *American Society for Testing Materials, Proceedings,* item 9-137, 1949.

9-187. Creep in Metals and Methods of Creep Testing. M. Randall. *Machinery* (London), v. 74, June 9, 1949, p. 772-773.

Typical creep-rate vs. stress and creep vs. time curves.

9-188. Application of Electrical Resistance Strain Gauges. A. L. Tannahill. *Engineer,* v. 187, June 10, 1949, p. 630-633.

Little published information can be found on techniques for applying strain gages and temperature compensators to surfaces and protecting them against damp atmospheres, drafts, liquids, or other substances which may come in contact with them. Hence, a research investigation of this subject was undertaken. As a result detailed directions are given for exterior gages (for use in air), and for interior gages (for use under water).

9-189. Air Conditioning Cuts Out Creep Test Compensations. *Steel,* v. 125, July 4, 1949, p. 95.

Creep-testing machines and testing porcedure in an air-conditioned room held at constant temperature at the research laboratory of National Tube Co.

9-190. Effect of Pulsating Loads on the Creep Characteristics of Aluminum Alloy 14S-T. M. J. Manjoine. *American Society for Testing Materials,* Preprint 27, 1949, 11 pages.

A testing machine in which oscillating and steady loads may be applied was developed to check the

influence of adding a small oscillating stress to the steady stress in a creep-rupture test. Results of a series of tests at 400° F. of 14S-T Al alloy specimens under an oscillating stress of 10% of the mean stress are reported. A possible explanation of the results.

9-191. Fatigue Characteristics of Aluminum Alloy 75S-T6 Plate in Reversed Bending as Affected by Type of Machine and Specimen. T. T. Oberg and R. J. Rooney. *American Society for Testing Materials,* Preprint 28, 1949, 9 pages.

Vibratory nonrotating cantilever fatigue tests were made in a Krouse plate fatigue machine (fixed deflection), using specimens having round, square, and rectangular critical sections. Rotating-beam specimens were tested in an R. R. Moore machine. Fatigue curves obtained for the various shapes showed maximum fatigue strengths for round specimens.

9-192. Life Tests Help to Choose Die Materials. J. R. Taylor and A. T. Hamill. *American Machinist,* v. 93, July 14, 1949, p. 116-118.

Several cast-alloy compositions and some cemented carbides were tested for suitability in long-life lamination dies. Typical compositions and properties of various cast alloys.

9-193. Apparatus for Tensile Testing at Sub-Zero Temperatures. E. J. Ripling and G. Tuer. *Engineers' Digest,* v. 10, June 1949, p. 199-200.

Previously abstracted from *Product Engineering.* See item 9-24, 1949.

9-194. Determination of Hardness of High-Speed Toolsteels at High Temperature. (In Russian.) A. P. Gulyaev and R. I. Mitel'berg. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 447-453.

Peculiarity of method described is compression of cylindrical test specimens at high temperature. Six different commonly used types of high speed steels have been investigated by this method. Results correspond closely to those obtained by other methods.

9-195. Applicability of a Method Using a Conical Indenter for Determination of Yield Point at High Rates of Deformation. (In Russian.) F. F. Vitman and N. A. Zlatin. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 453-456.

The data obtained are quite approximate, hence the method is recommended only when low accuracy may be justified by speed and simplicity of the determination. 10 ref.

9-196. A Basic Method of Determination and Calculation of Hardness. (In Russian.) V. K. Gringorovich. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 457-460.

Critically analyzes existing methods for hardness determination. The methods used for calculation of hardness from the test readings sometimes result in erroneous interpretations. A new method is proposed which would standardize such determinations.

9-197. Apparatus for Determination of Temperature Variation of Modulus of Elasticity by a Vibration Method. (In Russian.) V. A. Zhuravlev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 460-463.

Theoretical basis and technique for mathematical analysis of the results.

9-198. Wear Testing of Materials. (In Russian.) E. N. Maslov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 464-465.

A new type of apparatus. Results of testing of four different alloys (compositions given).

9-199. X-Ray Determination of Principal Stresses Using a Notch Method. (In Russian.) S. O. Tsobkallo and D. M. Vasil'ev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 468-470.

A new method for differentiated determination of principal stresses, developed by Terminasov and Sokolov. Theoretical bases of this method and techniques for calculation.

9-200. Testing of Non-Ferrous Metals for Production of Flat Springs. (In Russian.) M. A. Shklyar. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 474.

Simplified method based on that proposed by Butra. This method, already applied on an industrial scale, is valued because of its simplicity and rapidity.

9-201. Fatigue-Test Machine for High-Temperature Testing. (In Russian.) M. L. Bernshtein. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 497-500.

Optimum conditions of operation and method of calculation.

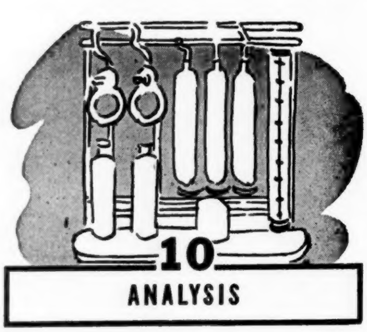
9-202. Creep-Test Machine Operating at Temperatures up to 800° C. (In Russian.) M. P. Markovets, T. N. Stasyuk, and N. N. Kolupaev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 500-502.

Complete specifications for equipment in operation in the Soviet Institute of Aviation Materials.

9-203. Undersökning av halborrade dragprovstavar. (Tensile Tests Using Test Pieces With Holes Bored in Them.) Gunnar Malmberg. *Jernkontorets Annaler,* v. 133, no. 4, 1949, p. 153-162.

Investigation using flat pieces of mild structural steel in which two parallel holes were bored from the flat sides and slits cut from the edges to the holes. When the diameter of the holes was varied, there was, as a rule, a transition from tough to brittle fracture. The diameter at which this transition takes place is a measure of the degree of brittleness of the steel.

For additional annotations indexed in other sections, see:
12-131; 13-49; 22B-224; 24A-103



10A—General

10A-93. The Influence of Extraneous Elements on Line Intensity. IV. Extraneous Element Effects in the Direct-Current Arc. Wallace R. Brode and Donald L. Timma. *Journal of the Optical Society of America,* v. 39, June 1949, p. 478-481.

Effect of varying amounts of extraneous element upon the line intensity of different elements. Slavin's total-energy method was used to make possible a more direct correlation than has been achieved using the internal-standard method. Effect of the extraneous element varies with amount, but not in a simple linear fashion. The elements can be arranged in a series based on their interelement effects in the d.c. arc. Arrangement in a series based on boiling points and excitation potentials is in agreement with experiment.

10A-94. Emulsion Calibration Scale for Quantitative Spectroscopic Analysis. Harold K. Hughes and R. W. Murphy. *Journal of the Optical Society of America,* v. 39, June 1949, p. 501-504.

Time devoted to collecting and plotting emulsion-calibration data can be reduced considerably by use of a new transmittance scale which is logarithmic from 1 to 30% and which then expands nonuniformly to 97%. Data from seven independent laboratories which establish the approximate linearity of the emulsion-calibration curves for several commercial films and plates. Practical uses.

10A-95. Uber die rhodancolorimetrische Bestimmung kleiner Eisenmengen. (The Thiocyanate Colorimetric Method for Determining Small Quantities of Iron.) Willy Hacker, Agnes Zimmermann, and Heinz Rechmann. *Fresenius' Zeitschrift fur Analytische Chemie,* v. 129, no. 2, 1949, p. 104-124.

Experiments which show that the ferro-thiocyanate reaction is an accurate and rapid method for determining small iron contents, and is unaffected by the presence of other metals. 10 ref.

10A-96. Bericht uber die Fortschritte der analytischen Chemie. I. Allgemeine analytische Methoden, analytische Operationen, Apparate und Reagenzien. (Report on the Progress of Analytical Chemistry. I. General Analytical Methods, Analytical Operations, Apparatus and Reagents.) R. Fresenius, A. Kurtenacker, and H. Freytag. **II. Chemische Analyse anorganischer Stoffe.** (Chemical Analysis of Inorganic Substances.) A. Kurtenacker and H. Freytag. **IV. Spezielle analytische Methoden. 2. Auf Handel, Industrie und Landwirtschaft bezugliche Methoden.** (Special Analytical Methods. 2. Methods Applicable to Commerce, Industry, and Agriculture.) W. Grutz and H. Freytag. *Fresenius' Zeitschrift fur Analytische Chemie,* v. 129, no. 2, 1949, p. 165-190, 202-207.

An extensive collection of brief "abstracts", each covering one or more papers dealing with a specific topic. References are mainly from the past decade.

10A-97. Improvement in Precision of Polarographic Analysis. Rolf K. Ladisch and Clifford E. Balmer. *Analytical Chemistry,* v. 21, June 1949, p. 679-683.

Effect of relative humidity upon dimensional changes of photo-recorded polarograms. A method for increasing the precision of wave-height measurements about 25-fold. 14 ref.

10A-98. Determination of Titanium and Iron; Rapid Control Determination of Both in Same Sample. B. A. Shippy. *Analytical Chemistry,* v. 21, June 1949, p. 698-699.

Method employs titration of a reduced solution with standard potassium permanganate. 16 ref.

10A-99. Volatilization of Elements From Perchloric and Hydrofluoric Acid Solutions. Francis W. Chapman, Jr., George G. Marvin, and S. Young Tyree, Jr. *Analytical Chemistry,* v. 21, June 1949, p. 700-701.

Mixed $HClO_4$ and HF solutions containing compounds of 37 ele-

ments were evaporated at 200° C. Such mixed solvents are often used during preparation of samples for analysis. Analysis of the residues showed that appreciable quantities of B, Si, Ge, As, Sb, Cr, Se, Mn, and Re are lost during such treatment. No losses of Na, K, Cu, Ag, Au, Be, Mg, Ca, Sr, Ba, Zn, Cd, Hg, La, Ce, Ti, Th, Sn, Pb, V, Bi, Mo, W, U, Fe, Co, or Ni were observed. 16 ref.

10A-100. Silica Refractories; Spectrographic Analysis Using a Controlled Multisource Power Unit. A. J. Herdle and H. J. Wolthorn. *Analytical Chemistry,* v. 21, June 1949, p. 705-707.

Method which utilizes a sample of the pulverized refractory directly for the determination of Ca, Mg, Ti, Al, Fe, Na, and K, and determines Si by difference.

10A-101. Determination of Aluminum in Presence of Iron; Spectrophotometric Method Using Ferron. W. H. Davenport, Jr. *Analytical Chemistry,* v. 21, June 1949, p. 710-711.

Previously abstracted from *U. S. Atomic Energy Commission,* item 10A-64, 1949.

10A-102. Silica Refractories; Spectrographic Analysis Using the Direct Current Arc and High Voltage Spark. Ralph H. Steinberg and Henry J. Belic. *Analytical Chemistry,* v. 21, June 1949, p. 730-731.

Method for alumina, titania, potassium oxide, and sodium oxide. Accuracy is comparable to best chemical methods.

10A-103. A Rapid Automatic Method of Computing Infrared Spectra for Quantitative Analyses. Robert W. Foreman and Warren Jackson, Jr. *Instruments,* v. 22, June 1949, p. 497-499.

Apparatus using a continuous-balance recording potentiometer. Mode of operation, reproducibility, and accuracy.

10A-104. Report of Committee E-3 on Chemical Analysis of Metals. *American Society for Testing Materials,* Preprint 73, 1949, 6 pages.

Includes miscellaneous recommendations for revisions in methods.

10A-105. Etude du systeme SiO_2-Al_2O_3-CaO par analyse quantitative aux rayons X. (Study of the System SiO_2-Al_2O_3-CaO by Quantitative X-Ray Analysis.) Marcel Von Euw. *Comptes Rendus* (France), v. 228, Apr. 4, 1949, p. 1226-1228.

Method for analysis and typical results for a series of slags. The possibility of quantitative analysis of complex compounds of different silicates and calcium aluminates is indicated.

10A-106. Tannin as a Reagent in Qualitative Analysis. (In English.) H. Holness. *Analytica Chimica Acta,* v. 3, May 1949, p. 290-294.

Tannin complexes of Bi and Ce are described for the first time and use of the reagent advocated as a routine test in the qualitative analysis of single substances. Specificity of the test is claimed for several elements. Usual qualitative group separation of tin is criticized and an alternative method offered.

10A-107. Tannin as a Reagent in Quantitative Analysis. (In English.) H. Holness and G. Mattock. *Analytica Chimica Acta,* v. 3, May 1949, p. 320-323.

Small positive errors observed in the determination of various elements were traced to heavy metal impurities by analysis of the ashes of six tannin samples. It was shown that treatment with 0.2 N NH_3, whereby impurities are precipitated, is effective in removing these errors

10A-108. Application of Solid Electrodes in Polarography. Part V. Solid Electrodes With Electrochemical Depolarization. (In Russian.) E. M. Skobets and P. P. Turov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 414-417.

Proposes application of a stationary electrode, which is renewed by electrochemical depolarization. Experimental investigation indicates attractive possibilities for use of such electrodes in polarographic analysis.

10A-109. (Book) **Tables of Reagents for Inorganic Analysis; Third Report of the "International Committee on New Analytical Reactions and Reagents" of the "Union internationale de Chimie."** 204 pages. 1948. Academic Press, New York 10, N. Y.

Material is presented in French, English, and German. Describes all new reactions and reagents from 1937 to 1947. Deals with qualitative reactions under the microscope, on the spot-plate, on filter-paper, in the micro and macro test-tube, and in the micro-crucible. Reagents are classified according to types, and arranged according to precipitation reactions, color and catalytic reactions, and those which do not belong to any other group.

10A-110. (Book.) **Reagents for Qualitative Inorganic Analysis.** 2nd report. P. E. Wenger and R. Duckert, editors; C. J. Van Nieuwenburg and J. Gillis, authors. 379 pages. 1948. Elsevier Publishing Co., 215 Fourth Ave., New York 3.

Tables of all reagents employed in the determination of cations and anions. Second Report covers reagents introduced into analytical practice between 1937 and 1943. Material is subdivided according to type of reaction. Details of procedure, sensitivity, and interference are included. 1172 ref.

10B—Ferrous

10B-57. Spectrograph Analysis of Very Small Samples of Steel. L. G. Young. *Engineer,* v. 187, May 27. 1949, p. 589-591.

Method for analysis of samples weighing as little as 0.005 g., all the usual elements being determined with the exception of phosphorus and sulfur. It is now possible to analyze most of the low-alloy and stainless steels. Extension to high speed steels containing up to 20% W is believed feasible.

10B-58. Polarographic Determination of Tin in Steel. W. E. Allsopp and V. R. Damerell. *Analytical Chemistry,* v. 21, June 1949, p. 677-679.

Procedures applicable to toolsteels and to plain carbon steels.

10B-59. Determination of Alumina in Steel; A Spectrochemical Method. R. H. Colin and D. A. Gardner. *Analytical Chemistry,* v. 21, June 1949, p. 701-704.

10B-60. Determination of Total Carbon in Pig Iron, High Carbon Iron, and Nodular Cast Iron. Roy E. Deas and Lillian T. Conradi. *Foundry,* v. 77, July 1949, p. 68-69.

Sieving technique using 40 and 100-mesh screens. The three portions obtained by screening the drill sample are weighed and analyzed separately. Typical results.

10B-61. Sur le dosage du fer métallique dans la poudre des minerais. (Determination of Metallic Iron in Mineral Powder.) Michel Portessis. *Comptes Rendus* (France), v. 228, Apr. 4, 1949, p. 1233-1234.

The apparatus of Schlösing-Grandeau, modified by Schulze-Tiemann, is used. The method gave very good results on siliceous rocks mixed with small quantities of known amounts of iron filings.

10B-62. Quantitative Spectrochemical Analysis of Cr-Ni(18-8) Steel, Using Solutions and a Hilger Medium Spectrograph. (In English.) J. Eeckhout. *Analytica Chimica Acta,* v. 3, May 1949, p. 377-382.

Analysis lines are given for Cr, Ni, Mn, Mo, Ti, Cu, and Cb in 18-8 steel. The average deviation for a single exposure varies from 4 to 9%.

10B-63. Separation of Beryllium From Iron by Solvents. R. S. Young. *Journal of Chemical Education,* v. 26, July 1949, p. 357.

Analytical procedure which is useful in the determination of small quantities of many elements in irons and steels.

10B-64. Indirect Colorimetric Method for Determining Lead in Steel. (In Russian.) A. M. Dymov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 395-397.

Method based on determination of Mo in a precipitate of lead molybdate.

10B-65. New Volumetric Method of Iron Determination. (In Russian.) B. N. Afanas'ev and A. V. Ural'skaya. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 407-408.

Method is characterized by the use of the sodium salt of paratoluene sulfonchloramide.

10C—Nonferrous

10C-103. Colorimetric Determination of Uranium With l-Ascorbic Acid. G. G. Smith, E. F. Orlemann, A. A. Smales, C. D. Rothernberger, and W. R. Grines. *U. S. Atomic Energy Commission,* AECD-2101, Nov. 7, 1947, 16 pages.

18 references.

10C-104. Die spektralanalytische Bestimmung von Blei, Antimon, Eisen und Zink in Bronze und Rotguss. (Determining the Content of Lead, Antimony, Iron, and Zinc in Bronze and Red Brass.) Gerd Maassen. *Zeitschrift fur Erzbergbau und Metallhuttenwesen,* v. 2, Apr. 1949, p. 103-112.

Directions for rapid quantitative spectrochemical analysis of copper alloys. Typical results. 17 ref.

10C-105. Zur Analyse des Bleiglanzes. (The Analysis of Lead Glance.) Imre Sarudi (v. Stetina). *Fresenius' Zeitschrift fur Analytische Chemie,* v. 129, no. 2, 1949, p. 96-99.

Defects of the earlier methods and a more accurate and simpler method using HCl and $HClO_4$.

10C-106. Polarographic Determination of Pentavalent Antimony in the Presence of Pentavalent Arsenic. I. M. Kolthoff and R. L. Probst. *Analytical Chemistry,* v. 21, June 1949, p. 753-754.

10C-107. A Quantitative Study of the Reaction Between Beryllium and Quinizarin, 2-Sulfonic Acid. Myron W. Cucci, William F. Neuman, and B. J. Mulryan. *U. S. Atomic Energy Commission,* AECD-1990, May 1948, 10 pages.

Procedure for microanalysis of Be in solutions free of interfering substances, which permits determination of 1-20γ Be (20 ml. volume) with a probable error of less than 5%.

10C-108. A Spectrochemical Method for the Determination of Uranium. L. T. Steadman. *U. S. Atomic Energy Commission,* AECD-2267, Aug. 10, 1948, 19 pages.

Method uses a d.c. carbon arc with a medium quartz spectrograph, applicable to various source materials including animal tissues and fluids, ores, soil, and vegetation. Range of measurement is 0.05-10 μg of U on the arc. Error is about $\pm 15\%$. 16 ref.

10C-109. Sur la thermogravimétrie des précipités analytiques. XXII. Dosage du Gallium. (Thermogravimetric Analysis of Analytical Precipitates. XXII. Determination of Gallium.) **XXIII. Dosage de l'Indium.** (Determination of Indium.) Thérese Dupuis and Clément Duval. **XXIV. Dosage de l'Uranium.** (Determination of Uranium.) Clément Duval. **XXV. Dosage du Chrome.** (Determination of Chromium.) Thérese Dupuis and Clément Duval. *Analytica Chimica Acta,* v. 3, May 1949, p. 324-352.

Continues series in which the Chevenard thermobalance was used to determine the most suitable reactions for quantitative determination of various ions, and of optimum temperatures for conversion of the various compounds into forms suitable for weighing. 63 ref.

10C-110. Quantitative Determination of Antimony Using Rhodamine "V". (In Russian.) L. E. Sabinina and A. P. Zolotukhina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 398-401.

Method differing from that of Frederic with respect to acidity of the medium in which the complex is formed, final acidity, and type of acid used. Theoretical bases of the proposed method.

10C-111. Determination of Silicon in Tungsten Alloys. (In Russian.) E. F. Pen'kova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 475.

Method characterized by use of phosphoric acid. Results are compared with those obtained by a fusion method.

10C-112. Determination of Chromium and Nickel in Silver Without Use of Silver Nitrate. (In Russian.) A. G. Bogdanchenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 475-477.

Electrometric titration method using the same sample for both determinations. Results of application to eight samples.

10D—Light Metals

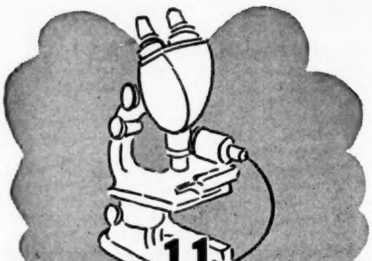
10D-26. Sampling Procedures in the Modern Die Casting Plant. James L. Erickson. *Light Metal Age,* v. 7, June 1949, p. 12-13, 20.

Recommended procedures for sampling Al and Mg in molten and ingot form prior to analysis.

10D-27. Betriebserfahrungen mit dem lichtelektrischen Kolorimeter von Dr. B. Lange. (Industrial Experiences With Dr. B. Lange's Photoelectric Colorimeter.) R. Bauer and J. Eisen. *Metall,* v. 3, June 1949, p. 187-189.

Use of the instrument as a rapid method for analyzing light alloys.

For additional annotations indexed in other sections, see: 2B-204; 3C-128; 8-202



11 APPARATUS, INSTRUMENTS and METHODS

11-221. Radioactivity Measurement Techniques. James H. Pannell. *U. S. Atomic Energy Commission,* AECD-2270, Nov. 13, 1947, 28 pages.

Techniques found useful in measuring alpha and beta particles and gamma rays. 15 ref.

11-222. Jet-Test for Determining the Thickness of Lead Coatings. R. A. F. Hammond. *Journal of the Electrodepositors' Technical Society,* v. 23, 1947-48, p. 113-120.

Preparation and standardization of a suitable reagent. Affect of temperature upon rate of penetration together with data concerning the stability of the reagent during storage.

11-223. Metallographic Examination of Beryllium Alloys. M. C. Udy, George K. Manning, and L. W. Eastwood. *U. S. Atomic Energy Commission,* AECD-2553, Apr. 1948, 22 pages.

Reasonably satisfactory technique developed for Be and Be-rich alloys.

11-224. Spitzenzähler und Zählrohr bei metallographischen Oberflächenuntersuchungen. (Point Counters and Counting Tubes for Metallographic Surface Investigations.) J. Kramer. *Zeitschrift fur Physik,* v. 125, Mar. 15, 1949, p. 739-756.

A method for using these instruments or investigating the condition and structure of a metal surface by measuring thermionic emission. Typical data for a series of common metals.

11-225. X-Ray Microscopes. C. S. Barrett. *Metal Progress,* v. 55, June 1949, p. 848, 890-892.

X-rays should furnish ideal radiation for microscopy because of their short wave length. Problems involved in possible development of such instruments.

11-226. Harness Nuclear Fission to Measure Engine Wear. *SAE Journal,* v. 57, June 1949, p. 52-54. Based on "Application of Radioactive Tracers to Improvement of Automotive Fuels, Lubricants, and Engines", by P. L. Pinotti, D. E. Hull, and E. J. McLaughlin.

11-227. Die Anwendungsgebiete der technischen Röntgen- und Gammadurchstrahlung. (Fields of Application of Industrial X-Ray and Gamma Radiation.) E. A. W. Muller. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 91, Apr. 15, 1949, p. 173-176.

A review. 186 ref.

11-228. Eine neue Aetzlösung fur Gusseisen und Stahl. (A New Etching Solution for Cast Iron and Steel.) Otto Schaaber. *Die Neue Giesserei,* v. 36 (new ser., v. 2), May 1949, p. 154.

Recommends use of a 1-3% solution of concentrated HNO_3 in con-

centrated acetic acid for metallography. Typical results.

11-229. Comparison of Methods for Determining Surface Area and Other Particle Size Data of Fine Powders, Particularly Welding Electrode Powders. P. D. Blake. *Journal of the Society of Chemical Industry,* v. 68, May 1949, p. 138-148.

Compares three methods — the Heywood, the Roller, and the modified Roller method—with data obtained by the hydrometer method.

11-230. An Electric Gage for Measuring the Inside Diameter of Tubes. Abner Brenner and Eugenia Kellogg. *Journal of Research of the National Bureau of Standards,* v. 42, May 1949, p. 461-464.

For measuring bores of about ½-in. inside diam. Operation depends on the mutual inductance of two coils. Diameter is read directly.

11-231. Pneumatic Feeder for Finely Divided Solids. C. W. Albright, J. H. Holden, H. P. Simons, and L. D. Schmidt. *Chemical Engineering,* v. 56, June 1949, p. 108-111.

Device developed by Bureau of Mines for uniform feeding of pulverized coal to a reactor. It should work with any finely divided solid.

11-232. The Trend Towards Automatic Control. A. G. Arend. *British Steelmaker,* v. 15, June 1949, p. 286-287.

Progress in automatic control in the chemical and artificial-fabric industries with advances in the steel industry. Recent American methods which are eliminating dependence on human skill.

11-233. Interferometric Determination of the Apparent Thickness of Thin Metallic Films. D. G. Avery. *Nature,* v. 163, June 11, 1949, p. 916.

Results of some experiments using the method described by Khamsavi and Donaldson in 1947. Measurements of the thinner film thicknesses obtained by this method should be treated with caution, since errors of the order of at least 30% may occur.

11-234. Strip Steel Extension Measured at Speeds of 2000 Feet Per Minute. *Steel,* v. 124, June 27, 1949, p. 80.

Method for indicating and recording percentage of extension during rolling in temper pass mills, using an extensometer.

11-235. A New Method of Measuring the Stopping Power of Several Materials for Alpha-Particles. F. Emmett Hammer and Frank E. Hoecker. *Review of Scientific Instruments,* v. 20, June 1949, p. 394-398.

Application of an atmospheric pressure alpha-particle detector to measurement of the above. Measurements of air-equivalent and relative stopping powers of films of mica, polystyrene, and aluminum. Relative stopping powers agree well with previous values.

11-236. Federgelenke fur Beanspruchungs- und Schwingungsmessgeräte. (Spring Joints for Stress and Vibration Measuring Instruments.) Heinrich Freise. *Archiv fur Technisches Messen,* May 1949, p. T33 (2 p.)

To eliminate unavoidable friction in ordinary types of joints and hinges, the use of spring joints for fine mechanical instruments is proposed.

11-237. Messung von mechanischen Stosswellen. (Measuring Mechanical-Impact Waves.) F. J. Meister. *Archiv fur Technisches Messen,* May 1949, p. T34-T35 (4 p.)

The theory of computing impact waves, and several mechanical methods of measuring their intensity. 11 ref.

11-238. Nomogramme zur Ermittlung der Aufnahmebedingungen bei der röntgenographischen Grobstrukturuntersuchung. (Nomograms for Determining Operating Conditions for X-Ray Macroscopy.) H. Verse. *Metall,* v. 3, June 1949, p. 179-184.

To facilitate the production of high-quality X-ray pictures, available numerical data are correlated in the form of nomograms. 13 ref.

11-239. Nomogramm zur Bestimmung des Massenabsorption-skoeffizienten μ/ρ fur Röntgenstrahlen von 0,1 bis 3 A. (Nomogram for Determining the Mass Absorption Coefficient μ/ρ for X-Rays of 0.1 to 3 A Wave Length.) Rudolf Böklen and Sonya Geiling. *Zeitschrift fur Metallkunde,* v. 40, Apr. 1949, p. 157-158.

Develops on the basis of experimental measurements a new relationship for the above, and a nomogram for its quick application.

11-240. A Review of Methods for Coating-Thickness Determination. R. S. Bennett. *Journal of Scientific Instruments and of Physics in Industry,* v. 26, June 1949, p. 209-216.

Various methods of nondestructively measuring the thickness of thin coatings on bases of a different material, usually mild steel. Two instruments were recently developed for use in the plating industry.

11-241. The Rapid Determination of Orientations of Cubic Crystals. C. G. Dunn and W. W. Martin. *Journal of Metals,* v. 1, sec. 3, July 1949, *(Metals Transactions,* v. 185), p. 417-427.

Method based on the fact that Bragg and azimuthal angles for two or more identified Laue diffraction spots completely determine the orientation of a crystal. Standard Laue photographs of the Majima and Togino type provide a ready

means for identifying Laue spots. Outlines procedure in detail after brief treatment of X-ray problems connected with orientation determinations. Useful principles and techniques.

INSPECTION and STANDARDIZATION

12-128. Field Experience on Gamma Ray Inspection of Welds in a High Pressure Pipe Line. A. B. Lauderbaugh and S. A. Brosky. *American Gas Association, Proceedings,* 1948, p. 368-371.
On a 130-mile 14" pipe line. Procedure and expense.

12-129. Report of Committee A-1 on Steel. *American Society for Testing Materials,* Preprint 1, 1949, 26 pages.
Major and minor suggested changes in specifications. Among the former are those for Si-Mn, Cr-V, and carbon-steel bars for springs; and for cold-rolled carbon-steel strip.

12-130. Report of Committee B-4 on Electrical Heating, Resistance and Related Alloys. *American Society for Testing Materials,* Preprint 11, 1949, 6 pages.
Miscellaneous recommendations and method for testing melts of cathode nickel in order to determine whether they are suitable for use in the production of electronic tubes.

12-131. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 12, 1949, 34 pages.
Miscellaneous recommendations for changes in specifications and test methods. Revised method for preparation of tension-test specimens for Cu-base alloys for sand castings.

12-132. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 14, 1949, 13 pages.
Recommendations for changes in specifications and test methods.

12-133. Development of Pressure-Vessel Codes. Elmer O. Bergman. *Welding Journal,* v. 28, June 1949, p. 523-525.
Preparation, revision, and interpretation of codes for construction of unfired pressure vessels. Provisions of the API-ASME code.

12-134. Testing Cathode Materials in Factory Production. J. T. Acker. *Proceedings of the I.R.E.,* v. 37, June 1949, p. 688-690.
Work of an ASTM subcommittee which has been devoted to development of a standard melt of cathode nickel for use in rating new melts by all tube manufacturers, and to establishment of standard test methods.

12-135. How to Get Your Money's Worth Out of Dial Indicators. I. A. Hunt. *American Machinist,* v. 93, June 16, 1949, p. 93-100.
Construction, maintenance, checking, mounting, and use.

12-136. Russian Standard for Cold-Drawn Wire. *Wire Industry,* v. 16, June 1949, p. 506.
Stand diameters and tolerance for 0.004-0.625 in. round wire.

12-137. Non-Destructive Testing of Mining and Other Engineering Components. A. C. Rankin. *Colliery Guardian,* v. 178, June 9, 1949, p. 776-779. A condensation.
Methods suitable for detecting surface and internal flaws, as well as other nondestructive tests.

12-138. Ultrasonic Testing of Aircraft Components. William C. Hitt. *Iron Age,* v. 163, June 23, 1949, p. 66-70.
Practical work done at Douglas Aircraft, including some interesting variations on ultrasonic equipment usage.

12-139. Nondestructive Flaw Detection. D. M. Kelman. *Westinghouse Engineer,* v. 9, July 1949, p. 115-118.
Methods, equipment, and applications.

12-140. Report of Committee E-7 on Non-Destructive Testing. *American Society for Testing Materials,* Preprint 76, 1949, 4 pages.
Includes proposed revised terminology for use in radiographic inspection of castings and weldments.

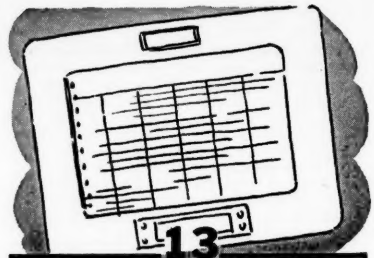
12-141. Some Problems in the Sampling of Bulk Materials. Louis Tanner and W. Edwards Deming. *American Society for Testing Materials,* Preprint 80, 1949, 6 pages.
Statistical theories are applied in the development of procedures for sampling sugar, tobacco, and wool, but have wide applicability.

12-142. Proving Ground for Quality. Arthur P. Schulze. *Products Finishing,* v. 13, July 1949, p. 28-34, 36.
The standards program of the Steel Kitchen Cabinet Institute. Tests on cabinet finishes.

12-143. Railroad X-Ray Laboratory. *Railway Mechanical Engineer,* v. 123, July 1949, p. 396-400.
Pennsylvania's installation at Altoona; case histories; problem of education.

12-144. Steel Products Manual. (Revised.) Sec. 14. **Tin Mill Products.** Sec. 15. **Hot Rolled Carbon Steel Wire Rods.** *American Iron and Steel Institute,* June 1949, 75 and 62 pages.
Two of series describing metallurgical aspects, manufacturing processes, specifications, and test methods.

For additional annotations indexed in other sections, see:
6B-105; 8-187; 19A-170; 22A-140



TEMPERATURE MEASUREMENT and CONTROL

13-47. Temperature Measurement; An Outline of Some Methods Used in Industry. H. Thompson and E. H. Lloyd. *Sheet Metal Industries,* v. 26, June 1949, p. 1259-1263.

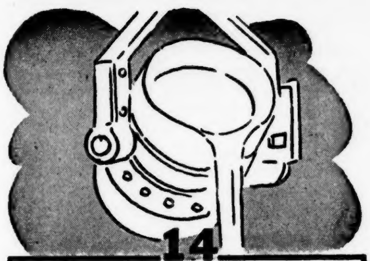
13-48. Heat Shading of Metals; A Valuable Research Aid. *Western Machinery and Steel World,* v. 40, June 1949, p. 78-79, 106.
Color-analysis system developed by Rebecca H. Smith, chief metallurgist of Turbodyne Corp., Hawthorne, Calif. How the method is used to determine maximum operating temperatures of turbine blades and other parts following test runs. Color shadings of components are compared with a "sample box" prepared by the laboratory.

13-49. High Temperature Testing Requires Top Accuracy. C. C. Roberts. *Canadian Metals and Metallurgical Industries,* v. 12, June 1949, p. 22, 37.
Creep-test furnace and commercial control equipment.

13-50. New International Temperature Scale. *Metal Industry,* v. 74, June 24, 1949, p. 504, 506.
The Ninth General Conference on Weights and Measures adopted last October a revised International Temperature Scale which, at high temperatures, differs in some important respects from the original International scale of 1927. The new scale came into force on January 1, 1949. Construction of scales and behavior of ideal gas.

13-51. Calculation of Temperature on the Basis of Indication of a Platinum-Platinum-Rhodium Thermocouple. (In Russian.) B. I. Pilipchuk. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Apr. 1949, p. 492-494.
Simplified formulas for the above calculation.

For additional annotations indexed in other sections, see:
16A-62; 16B-71



14 FOUNDRY PRACTICE

14A—General

14A-81. On Accuracy of Sieve Analyses Made by Means of Sieving Machines. (In English.) Sture Mörtsell. *Acta Polytechnica* (Mechanical Engineering Series), v. 1, No. 6, 1949, 45 pages.
Previously abstracted from *Transactions of the Royal Institute of Technology,* item 14A-1, 1949.

14A-82. Radioisotope Gage Indicates Liquid Metal Height in Cupolas. Don M. McCutcheon. *American Foundryman,* v. 15, June 1949, p. 35-39.
Method for continuous indication, using cobalt 60. Variations in design will permit indication of a single level, multiple levels, or continuous indication at all times during the melting and pouring cycle.

14A-83. Friction Saw Cuts Castings Cleaning Cost. H. J. Chamberland. *American Foundryman,* v. 15, June 1949, p. 44-47.
Techniques, applications, and advantages.

14A-84. Cast Figure Process Reduces Machining Costs. George Krumlauf. *American Foundryman,* v. 15, June 1949, p. 50-52.
Process and its applications. Use of molds thus manufactured is becoming more common in the processing of glass, plastics, and light metals. Molds, rings, plungers, valves, forming equipment, and similar parts manufactured by this method are found to have excellent life.

14A-85. Foundry Data: Collecting; Organizing; Analyzing. W. K. Bock. *American Foundryman,* v. 15, June 1949, p. 53-56.
Application of statistical methods.

14A-86. Centrifugal Casting Welding Rods. M. W. Williams. *Steel,* v. 124, June 20, 1949, p. 98-99.
Methods and equipment for making rods used in facing rock bits. Cast-iron permanent chill molds are used. Fewer misruns and other difficulties result from this method than from conventional casting.

14A-87. Core-Making at Coneygre Foundry. A. R. Parkes. *Foundry Trade Journal,* v. 86, June 9, 1949, p. 543-547.
Development and use of a quick-drying core binder.

14A-88. Naturally-Bonded Versus Synthetic Sands. *Foundry Trade Journal,* v. 86, June 9, 1949, p. 553-556.
A general discussion opened by remarks of J. J. Sheehan and W. B. Parkes, the former of which favored natural sands and the latter, the synthetic type.

14A-89. Precision-Cast Milling Cutters Could Solve a Crisis. John H. Penrose and Catherine T. Amond. *American Machinist,* v. 93, July 14, 1949, p. 89-93.
Procedure for precision-casting cutter from tool scrap. Results of laboratory machining tests indicate that performance of the cast cutters is superior to that of the forged cutters.

14A-90. Mechanized Units Installed by Textile Machine Works Foundry. William G. Gude. *Foundry,* v. 77, July 1949, p. 82-87.
Equipment and procedures for ferrous and nonferrous foundry work.

14A-91. Innovations in Investment Casting Cut Cost of Finished Parts. *Production Engineering & Management,* v. 24, July 1949, p. 58-59.
Procedure used by Precision Metalsmiths, Inc., for making castings by the investment method, which greatly reduces requirements for machine finishing. Illustrated.

14A-92. Precision Investment Molding Process. J. H. Wernick. *U. S. Atomic Energy Commission,* AECD-2439, Mar. 17, 1947, 14 pages.
Details of the process, especially as applied during the war to the casting of Vitallium turbosupercharger blades. 10 ref.

14A-93. Moulding Practice. *B.S.F.A. Bulletin,* v. 1, May 1949, p. 1-7.
Recommended procedures for sand control, the centrifugal process, the lost-wax process, strickle molding, stack molding, and mold drying. Discusses mold washes.

14A-94. Les argiles colloidales Francaises et leurs applications a la preparation des sables synthetiques. (French Colloidal Clays and Their Application in Preparation of Synthetic Molding Sands.) Pierre Nicolas. *Fonderie,* Mar. 1949, p. 1510-1520; Apr. 1949, p. 1545-1553.
The above was investigated for 18 different types. Applicability of each for use as a basic material for synthetic sand is indicated.

14A-95. Mesure des débits d'air soufflés au cubilot. (Determination of the Rate of Air Flow in a Cupola.) Henry Gernelle. *Fonderie,* Apr. 1949, p. 1554-1558.
Comparative analysis results in recommendation of the Pitat-Ritter device. Details of construction of the latter and optimum conditions of operation.

14B—Ferrous

14B-68. Modern Foundry Methods. *American Foundryman,* v. 15, June 1949, p. 40-42. Based on paper by Harold G. Sieggreen.
Procedures in designing pattern equipment for use in a high-production malleable foundry. All patterns, core boxes, and driers are drawn up in full detail. Each part is studied with respect to placement of the parting line, position of gates, most practical type of pattern equipment to use, and whether any casting design changes should be requested. Yield, scrap, gate removal, number of cores needed, amount of finish stock and draft required, and whether a straightening die will be needed.

14B-69. Convert Ladle Dimensions to Iron Weight. H. L. Campbell. *American Foundryman,* v. 15, June 1949, p. 48-49.
Determining capacities of iron-foundry ladles.

14B-70. Das Zementsandform- und kernverfahren-Einfuhrung in seine Theorie und Beispiele fur seine praktische Anwendung. (The Cement-Sand Mold and Core Process—Introduction Into Its Theory and Examples of Its Practical Application.) Martin Beilhack. *Die Neue Giesserei,* v. 36 (new ser., v. 2), May 1949, p. 138-142.
Method and its applications.

14B-71. Production of Medium and Heavy Iron Castings. G. W. Nicholls. *Foundry Trade Journal,* v. 86, May 26, 1949, p. 493-499; June 2, 1949, p. 525-528; June 9, 1949, p. 549-550; discussion, p. 550-552.
Various factors involved, including design, pattern construction, contraction and shrinkage, metal composition, runners and risers, cores, casting procedures, and raw materials. Step-by-step procedure.

14B-72. Reducing Atmosphere Pollution From Cupola Operation. *Industrial Heating,* v. 16, June 1949, p. 1010. Condensed from paper by John F. Drake and T. G. Kennard.
See abstract from *Iron Age,* item 14B-50, 1949.

14B-73. Machine Molding of Steel Castings. John Howe Hall. *Foundry,* v. 77, July 1949, p. 78-81, 186, 188-191.
First of four articles describing methods and equipment.

14B-74. Electrolytic Manganese in Acid Electric Steel Foundry Practice; Tests at National Malleable & Steel Castings Co., Sharon, Pa. *U. S. Bureau of Mines,* Report of Investigations 4482, June 1949, 23 pages.
Effect of electrolytic manganese on medium-manganese steel castings. In no case were the castings unsatisfactory, and the additional advantages of using manganese in pure form were apparent. Although the castings retained slightly more hydrogen than those made with ferromanganese, the hydrogen content was still within the permissible range and produced no deleterious effects.

14C—Nonferrous

14C-53. Nitrogen Degassing of Nonferrous Metals. T. W. Eselgroth. *Metal Progress,* v. 55, June 1949, p. 817-820.
Procedures and equipment. Advantages over other methods.

14C-54. Melting and Casting of Brass. *Industrial Heating,* v. 16, June 1949, p. 1006-1008. Condensed from paper by Maurice Cook and N. L. Fletcher.
Previously abstracted from *Journal of the Institute of Metals,* item 14C-17, 1949.

14C-55. Melting and Casting of Silver Nickel. *Industrial Heating,* v. 16, June 1949, p. 1008. Condensed from paper by E. J. Bradbury and P. G. Turner.
Previously abstracted from *Journal of the Institute of Metals,* item 14C-18, 1949.

14C-56. Cause and Prevention of Gas Porosity in Copper-Base Alloys. *Foundry,* v. 77, July 1949, p. 147-148. Reprinted from "Copper-Base Casting Alloys" (Federated Metals Div., American Smelting & Refining Co., New York).
Brief summary of causes and recommendations for preventive refining, melting, and pouring procedures.

14C-57. Die-Casting Practice and Technique. XIII. Die Block Locking Mechanisms. XIV. Features of Semi-Permanent Gravity Die Designs. W. M. Halliday. *Metal Industry,* v. 74, May 20, 1949, p. 447-449; June 10, 1949, p. 467-469; June 17, 1949, p. 486-488.

14C-58. Problems in Bronze Foundry Practice. Austen J. Smith. *Engineering,* v. 167, June 17, 1949, p. 557-558; *Foundry Trade Journal,* v. 86, June 23, 1949, p. 615-620.
Mechanics of solidification of brass and bronze alloys, and a few of the factors that interfere with normal solidification processes.

14D—Light Metals

14D-31. Light Alloy Casting. *Metal Industry,* v. 74, June 10, 1949, p. 459-463.
British plant experience. Includes heat-treating department.

14D-32. Le refroidissement des moules dans la coulée en source des alliages légers. (Cooling of the Mold During Bottom Casting of Light Alloys.) André Caillon. *Revue de l'Aluminium,* v. 26, May 1949, p. 151-157.

Problems involved in cooling without harmful distortion and shrinkage. Proper use of chills in the lower parts and maintenance of heat in the upper part by use of feeders. Pouring speed and pouring temperature should also be properly controlled.

14D-33. Long Core Pull for Die Cast Magnesium Chair. T. Caldwell, Jr. *Die Castings,* v. 7, July 1949, p. 21, 60-61.

Procedure used for fabricating folding chairs.

14D-34. Heating Elements Cast as Inserts. *Die Castings,* v. 7, July 1949, p. 34-36, 66-67.

Procedure for casting tubular type electrical heating elements as inserts in Al die castings.

14D-35. Examples of Aluminum-Alloy Foundry Practice. J. Caven and H. W. Keeble. *Foundry Trade Journal,* v. 86, June 23, 1949, p. 621-626; June 30, 1949, p. 639-648.

Basic features of various production methods. Handling jobbing or semi-jobbing quantities on a self-contained sand-molding-machine circuit; production and heat treatment of large diesel engine piston castings; making a large paraboloid-shaped casting by the gravity die method; and a special-purpose die casting made with a sand core. The second installment gives varied examples of large sand and die cast Al pieces. Heat treatment procedure for diesel engine pistons.

14D-36, (Book). **The Production of Magnesium Castings.** G. B. Partridge. 89 pages. Kennedy Press, Ltd., 31 King St. West, Manchester 3, England. (Metallurgia Monograph No. 1.) 4s., 6d.

Begins with magnesium extraction and manufacture of the Elektron alloys, followed by chapters on the various casting techniques. Final sections deal with commercial applications, economic factors, and design principles. Explains foundry methods and layout. Both theory and practical requirements.

For additional annotations indexed in other sections, see:
3B-146; 7B-126; 8-181; 24C-10

15 SCRAP and BYPRODUCT UTILIZATION

15-47. Metallurgical Plant Wastes and Their Treatment. Harry D. Unwin. *Chemical Engineering Progress* (Engineering Section), v. 45, June 1949, p. 351-357; discussion, p. 357-358.

Principles and their application to design of a modern waste treatment and disposal system for the new ball-bearing plant.

15-48. Smog Control Helps Bag More Profits. Norman C. Brundage. *Western Metals,* v. 7, June 1949, p. 21-23.

Collector and its operation; controls smoke and collects enough lead oxide to pay for itself in one year.

15-49. The Disposal of Spent Acid Pickling Liquor. W. B. Wragge. *Journal of the Iron and Steel Institute,* v. 162, June 1949, p. 213-224.

Methods generally used, with emphasis on H_2SO_4 liquors. Neutralizing and crystallizing techniques associated with acid recovery. Operating costs and materials of construction. A ternary equilibrium diagram for the H_2O-$FeSO_4$-H_2SO_4 system. The problem of disposal of ferrous sulfate. 18 ref.

15-50. Plating Waste Disposal. Jerome L. Bleiweis. *Iron Age,* v. 163, June 16, 1949, p. 78-83.

Techniques of treating the various waste solutions, economics involved, and information on a disposal plant.

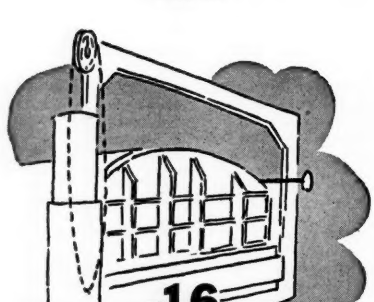
15-51. Ausweitung der Verwertung von Hochofenschlacke. (Extending the Range of Utility of Blast Furnace Slag.) Heinz Schumacher. *Stahl und Eisen,* v. 69, May 26, 1949, p. 372-378.

Possibilities and methods of producing sinter pumice, roofing slate, concrete articles, refractory brick, and building materials from blast-furnace slag. Automatic installations for the production of refractory brick and roofing slate.

15-52. Disposal of Plating Room Wastes. I. A Critical Review of the Literature Pertaining to the Disposal of Waste Cyanide Solutions. Barnett F. Dodge and D. C. Reams. *Plating,* v. 36, July 1949, p. 723-725, 728-732.

Production of insoluble cyanides, reaction of cyanide with aldehydes, ion exchange, and choice of process. 85 ref.

For additional annotations indexed in other sections, see:
14A-89



16 FURNACES and HEATING DEVICES

16A—General

16A-59. The Measurement of Heat Input Into a Furnace. *Journal of the Society of Glass Technology,* v. 33 (Transactions Section), Feb. 1949, p. 19-26.

Methods for measurement of flow of clean gas; of hot, raw producer gas; and of liquid fuels. Methods for calorific-value determination.

16A-60. Induction Heating; The Principles, Equipment and Technical Considerations. *Automobile Engineer,* v. 39, June 1949, p. 239-242. Based on paper by H. B. Osborn, Jr.

16A-61. Large Modern Industrial Gas Fired Processes Tailored to Fit the Job. James Kniveton. *Industrial Gas,* v. 27, June 1949, p. 10, 23-24.

Furnaces and applications to various metals.

16A-62. Design and Performance of Modern Large Rotary Furnaces. A. F. Kritscher. *Industrial Heating,* v. 16, June 1949, p. 984, 986, 988. A condensation.

In cooperation with three large companies, a series of tests was run to determine the relationship of furnace to steel temperatures, inside to outside steel temperatures, and corresponding hearth, roof, and side-wall temperatures. Design and temperature control, and recommendations for optimum operation under varying plant conditions.

16A-63. Fundamental Data for Induction and Dielectric Heating. Part I. Applications and Selection of Equipment. *Industrial Heating,* v. 16, June 1949, p. 990-992, 994.

16A-64. Electric Heaters in Recirculating Type Industrial Ovens. R. J. Ruff. *Industrial Heating,* v. 16, June 1949, p. 1047-1048, 1050, 1052, 1054, 1062.

Evolution of the uniform heating of electrically heated ovens by recirculation of preheated air; factors influencing the present practice of determining volume and velocity of recirculated air; structural qualifications required of resistance-type oven-air heaters; and placement of heaters within the oven system.

16A-65. Construction and Testing of Surface-Combustion Furnaces. Leo Brewer and George H. West. *U. S. Atomic Energy Commission,* MDDC-550, Dec. 17, 1946, 5 pages.

Two of the above furnaces for sintering of oxide crucibles were constructed and used up to 2000° C. with propane as fuel. MgO and ZrO_2 were found to be satisfactory construction materials.

16B—Ferrous

16B-70. Tata "A" Blast Furnace Makes Over Three Million Tons. E. T. Warren. *Blast Furnace and Steel Plant,* v. 37, June 1949, p. 673-675.

Experiences with Indian furnace described in the May 1940 issue. During over 8 yrs., the furnace was never blown out. Production figures and chemical analysis of the refractories used in four locations.

16B-71. Recent Steelplant Developments at the Appleby-Frodingham Steel Company. A. Jackson. *Journal of the Iron and Steel Institute,* v. 162, June 1949, p. 136-162.

Numerous diagrams, tables, graphs, and illustrations. Layout, mixer practice and design, furnace design and refractories, operation, and instrumentation.

16B-72. Variety of Furnaces Used in Fabricated Pipe Production. Arthur Q. Smith. *Industrial Heating,* v. 16, June 1949, p. 996, 998, 1000, 1002, 1004.

16B-73. (Book). **Anhaltszahlen Fuer Die Waermewirtschaft Auf Eisenhuettenwerken.** (Average Values for Heat Economy in Iron and Steel Works.) Ed. 4. K. Rummel, editor. 213 pages. 1947. Stahleisen, Duesseldorf, Germany. (U. S. agent: Stechert-Hafner, Inc., 31 East 10th St., New York 3, N. Y.) $11.75.

Like former editions, this book treats fuel and power consumption in the coke plant, the blast furnace plant (including sintering), the converter plant, openhearth plant, electric-furnace shop, rolling mill and forge shop, foundry, heat treating department, water supply, gas-producers, power plant, space heating, also fuel and energy consumption of integrated works. Begins with the fundamentals of heat

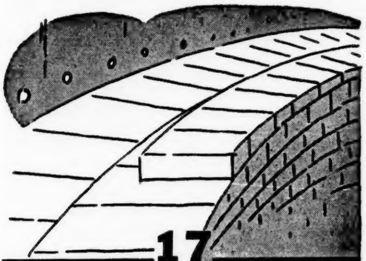
and furnace engineering, and ends with tables for metallurgical reactions and reaction heats.

16C—Nonferrous

16C-8. Controlled Drying of Retorts. R. R. Furlong and D. H. Wertz. *Journal of Metals,* v. 1, sec. 3, July 1949, *(Metals Transactions,* v. 185), p. 393-394.

Process and equipment used at the Donora Zinc Works, Donora, Pa.

For additional annotations indexed in other sections, see:
2B-196; 18B-111; 18D-10; 21B-38



17 REFRACTORIES and FURNACE MATERIALS

17-55. Note on the Preparation of Small Dense Beryllia Crucibles. Helen B. Barlett. *U. S. Atomic Energy Commission,* AECD-2170, Aug. 1945, 3 pages.

Method consists of hot pressing beryllia containing a thermal-setting, phenol-formaldehyde resin; carefully oxidizing the resin; and firing in a small alumina kiln to about 1800° C.

17-56. The Oxidation of Silicon-Carbide Refractory Materials. A. C. Lea. *Journal of the Society of Glass Technology,* v. 33 (Transactions Section), Feb. 1949, p. 27-50.

Rate of oxidation of silicon-carbide grain and of silicon-carbide refractory in various atmospheres. The influence of steam in accelerating the speed of oxidation, and possible reasons for this effect.

17-57. Properties of Refractory Materials. S. M. Phelps. *American Foundryman,* v. 15, June 1949, p. 58-59.

Properties for 19 materials. Factors connected with slag effects.

17-58. Mechanism of Erosion of Nozzles in Open-Hearth Ladles. R. B. Snow and James A. Shea. *Journal of the American Ceramic Society,* v. 32, June 1, 1949, p. 187-194.

Experiments made with removable nozzle extensions to determine the relative amount of erosion when various types of steel are teemed through regular fire-clay nozzles fired to different temperatures and nozzles of the more refractory types.

17-59. Die Strahlungseigenschaften von feuerfesten Steinen und Schlacken und deren Einfluss auf den Wärmeubergang. (The Radiating Properties of Refractory Bricks and Slags and Their Effect on Heat Transfer.) Gerhard Naeser and Werner Pepperhoff. *Stahl und Eisen,* v. 69, May 12, 1949, p. 325-328.

Role in the openhearth. The amounts of reflected heat from luminous and nonluminous flames were measured and it was found that heavy-metal oxides greatly increase the reflection of nonluminous flames.

17-60. Die Silikamörtel, ihre Anwendung und Prufung. (Silica Mortar, Its Use and Testing.) Hubert Grewe and Fritz Harders. *Stahl und Eisen,* v. 69, May 26, 1949, p. 378-381.

An illustrated discussion based on the literature (mostly German) of the past 25 years.

17-61. Basic Refractories; Their Chemistry in Relation to Their Performance. J. R. Rait. *Iron and Steel,* v. 22, May 12, 1949, p. 187-193; June 1949, p. 289-293.

Phase constitution and transformations; properties; performance under various conditions, etc. 63 ref. (To be continued.)

17-62. Maintenance of Furnace and Soaking Pit Hearths. *Industrial Heating,* v. 16, June 1949, p. 1067-1068. Condensed from "The Maintenance of Hearths in Heating Furnaces and Soaking Pits," by Charles N. Jewart.

Various types of hearth material, and experience with an installation composed of different combinations of basic refractories, each in its own section, in order to determine the most satisfactory material.

17-63. Higher Temperature Refractories. Goal of New Research Laboratory. Dan Reebel. *Steel,* v. 125, July 11, 1949, p. 84-86.

Programs of General Refractories Co. laboratory in Baltimore which include the development of the all-basic openhearth furnace and necessary auxiliary processes; also investigations concerned with higher temperature refractories.

17-64. Facteurs d'émission des produits réfractaires silico-alumineux a haute température. (Emission Factors of Silica-Alumina Refractory Materials at High Temperatures.) Marcel Michaud. *Comptes Rendus* (France), v. 228, Mar. 28, 1949, p. 1115-1116.

Factors of monochromatic emission of refractory oxides from 1000 to 1600° C. were investigated. It was established that the size of grains and the traces of iron oxide are the main factors in variation of the above factors. Chemical composition of the materials seems to have only a slight influence.

17-65. Forsterit als "basisches" Futter fur grosse Hochfrequenzöfen. (Forsterite as Basic Lining for Large High-Frequency Furnaces.) Helmut Stutzel. *Stahl und Eisen,* v. 69, June 9, 1949, p. 403-405.

Various refractory linings, and production of forsterite ($MgSiO_4$). Experiments showed advantages of this material over other linings.

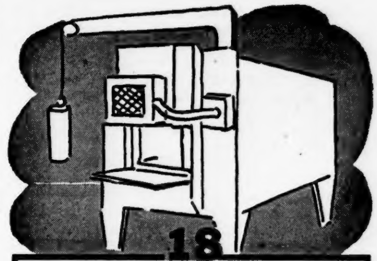
17-66. Effect of Oxygen on Refractories in the Basic Open Hearth. R. S. Moore. *Iron and Steel Engineer,* v. 26, July 1949, p. 47-50; discussion p. 50.

Previously abstracted from condensation in *Industrial Heating.* See item 17-29, 1949.

17-67. Assessment of the Resistance of Refractory Materials to Sudden Temperature Variations. A. Giannone. *Engineers' Digest,* v. 10, June 1949, p. 189-192. Translated and condensed from *Il Calore,* v. 19, Nov. 1948, p. 398-401.

Develops a graphical method for the determination of the stresses acting in a plane wall of infinite length. Known factors are: temperatures occurring at various distances within the wall at a given instant; mean value of coefficient of thermal expansion; modulus of elasticity; and rupture strength of the material.

For additional annotations indexed in other sections, see:
2B-193; 16A-65; 16B-70-71



18 HEAT TREATMENT

18A—General

18A-23. Selective Surface Hardening With Flamatic Hardening Machine. William F. Schleicher. *Machine and Tool Blue Book,* v. 45, July 1949, p. 83-86, 88.

Machine provides electronic temperature control of surface hardness and depth of heat penetration. Heating cycle can be raised 500° F. in 1 sec., and flame temperatures up to 6200° F. are possible.

18A-24. Tempering in a Steam Atmosphere. H. M. Parshall. *Machinery* (London), v. 74, June 23, 1949, p. 844-846.

Technique and equipment for both ferrous and nonferrous metals. Increased tool life, reduction of scale formation, and treatment of powdered metal parts.

18B—Ferrous

18B-111. Protective Atmospheres in Industry. Parts VI and VII. A. G. Hotchkiss and H. M. Webber. *General Electric Review,* v. 52, May 1949, p. 30-37; June 1949, p. 33-41.

May installment describes effects of atmospheres of combusted fuel gas—purified and unpurified—and catalytically reacted fuel gas in preventing decarburization in various heating processes. Neutralene and Thermalene gas-producing equipment. Comparative structures. June installment deals with methods of carburizing; advantages of gas atmospheres; carrier gases and what they accomplish; and importance of dew point and other atmospheric conditions in obtaining desired carbon penetration, concentration, or restoration. Equipment. (To be continued.)

18B-112. Gas Carburizing. C. H. Leland. *Metal Progress,* v. 55, June 1949, p. 811-815.

Practical problems involved, indicating simple fundamental principles which must be understood in order to obtain good results. A few common shop troubles and how to correct them. Prefers batch-type carburizing for most jobs, especially where less-than-maximum surface carbon is specified.

18B-113. Carbide Replaces Steel for Razor-Blade Tempering. *American Machinist,* v. 93, June 16, 1949, p. 84.

18B-114. Härteverhalten und Schneideigenschaften von Stählen mit 9 bis 13% Cr. (Hardenability and Machinability of Steels Containing 9-13% Cr.) Franz Rapatz, Helmut Krainer, and Karl Swoboda. *Archiv fur das Eisenhuttenwesen,* v. 20, Mar.-Apr. 1949, p. 115-123.

The effects of hardening and tempering (with and without severe quenching) on the structures, high-temperature tensile strengths, hot

hardnesses, and machinabilities of high-carbon (1-2% C) steels alloyed with varying percentages of Si, Mn, Cr, Mo, V, and W. 21 ref.

18B-115. Dew Point vs. %CO_2 as Furnace Atmosphere Control Check. Wilson T. Groves. *Industrial Heating,* v. 16, June 1949, p. 966-970, 972, 974, 976, 978, 980, 1086.

Uses several of the gas equilibrium equations formulated by Harris to prepare charts showing relationships between the gaseous constituents of common prepared atmospheres and carbon concentrations of the steel in contact with them. How the heat treater can evaluate his atmosphere in terms of %CO_2 and dew point.

18B-116. Isothermal Heat Treatment of Large Steel Castings. Don Rosenblatt. *Iron Age,* v. 163, June 30, 1949, p. 42-47.

Practical limitations imposed by economics which introduce difficulties in meeting metallurgical requirements when heat treating large, low-alloy steel castings. Systematic investigation of the adaptability of various heat treatment cycles, including considerable quantitative data. Application of the techniques to plain carbon steel castings.

18B-117. Practical Pointers on Steel Treating. Part VII. W. R. Bennett. *Modern Machine Shop,* v. 22, July 1949, p. 166, 168-170, 172-174, 176-177.

Deals with high speed steel. Annealing, preheating, heating for hardening, cooling rate, and checking pyrometer readings by use of a hardness tester.

18B-118. The Basic Principles of Carburizing. III. E. Barber. *British Steelmaker,* v. 15, June 1949, p. 282-285.

The technique of gas carburizing, with its advantages, and the various types of carburizing furnaces. Modern methods of liquid carburizing; causes of unsatisfactory carburizing. (To be continued.)

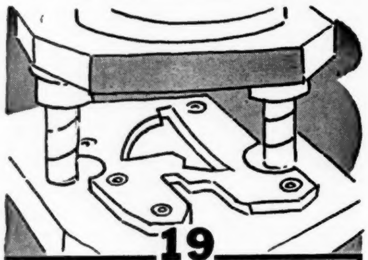
18D—Light Metals

18D-10. Aluminum Wire. Section IV. Heat Treatments of Aluminum Alloy Wire. D. C. G. Lees. *Wire and Wire Products,* v. 24, June 1949, p. 494-497; discussion, p. 497, 543-544.

Metallurgical considerations, procedures, and furnaces.

For additional annotations indexed in other sections, see:

3D-51; 4D-41; 14D-31; 19B-123; 19D-43; 20B-103; 21B-36



19 WORKING

19A—General

19A-153. Cold Rolling Technique. IV. Simplified Rolling Mill Calculations. (Continued.) Hugh Ford. *Sheet Metal Industries,* v. 26, May 1949, p. 960-962; discussion, p. 963-964; June 1949, p. 1205-1208.

May issue—method of calculation, using the lever arm as a fraction of the deformed arc length, and examples. June issue—Cook and Larke's method based on the lever arm, and its derivation. (To be continued.)

19A-154. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 26, June 1949, p. 1227-1234.

Future trends, and various features of present-day equipment. (To be concluded.)

19A-155. Power Squaring Shears: Operation and Maintenance. *Sheet Metal Worker,* v. 40, June 1949, p. 39-41.

19A-156. It's Easy to Calculate Die Clearances. J. R. Paquin. *American Machinist,* v. 93, June 16, 1949, p. 102-103.

Two simple rules and two tables of constants which enable the designer to make correct allowances on piercing and blanking dies.

19A-157. Die Mechanisierung des Feinblechwalzwerkes. (Mechanization of Thin-Sheet Rolling Mills.) Wilhelm Krämer. *Stahl und Eisen,* v. 69, May 26, 1949, p. 359-371.

Design details of various types used in Germany since the latter part of the 19th century.

19A-158. Production Economies Gained by Using Standard Oil-Hydraulic Presses for a Variety of Tasks. W. C. Denison. *Modern Industrial Press,* v. 11, June 1949, p. 6, 8, 38.

Switch-over from ordinary shop chores to special job-setups, by means of tooling and accessories for standardized equipment, to reduce costs.

19A-159. High Speed Presswork Accuracy Basic in Burroughs Production Plan. P. D. Aird. *Modern Industrial Press,* v. 11, June 1949, p. 13-14, 18, 22, 38.

Fabrication of various parts for accounting and calculating machines. Tolerances.

19A-160. Presses Important in the Manufacture of Vibration Control Mountings. Walter Rudolph. *Modern Industrial Press,* v. 11, June 1949, p. 26, 28, 30, 34.

Presses and production procedures for the above and bonded rubber products.

19A-161. Small Presses Help "Keep 'Em Flying" at Spokane Air Force Base, Spokane, Wash. Howard E. Jackson. *Modern Industrial Press,* v. 11, June 1949, p. 40, 42, 46.

Setup for repairing B-29 superforts. Work breaks down to line work, fabrication, and manufacture and repair of parts in shops.

19A-162. Beam and Channel Roll Design. Ross E. Beynon. *Iron and Steel Engineer,* v. 26, June 1949, p. 51-76.

19A-163. Trends in High Speed Rolling. Ralph H. Wright. *Iron and Steel Engineer,* v. 26, June 1949, p. 77-80; discussion, p. 80-82.

Believes that maximum rated rolling-mill speeds have now reached such high limits that developments in the near future will be directed to more effective utilization of available speeds.

19A-164. Metal Spinning Geometry. *Western Machinery and Steel World,* v. 40, June 1949, p. 94-95.

Thickness and diameter vs. speed for Al, Cu, brass, cold rolled steel, and stainless steel; also chart of peripheral metal-spinning speeds, showing geometrically related thickness and diameter for actual case histories.

19A-165. A Simple Type of Draw-Bench: Its Design and Applications. A. Schofield. *Machinery* (London), v. 74, June 9, 1949, p. 774-776.

Use of rolls as well as draw

blades for forming of sheet metal.

19A-166. Eight Reasons for Indirect Piloting. J. R. Paquin. *American Machinist,* v. 93, June 30, 1949, p. 80-81.

Two methods of piloting in progressive dies. Direct piloting consists of piloting in holes punched in the part at a previous station. This is the ideal method. However, when ideal conditions do not exist, indirect piloting must be used to achieve the desired results. The latter consists of piercing holes in the scrap strip and locating these holes with pilots at later operations.

19A-167. Continuous Rod Drawing, Straightening, Polishing. Dan Reebel. *Steel,* v. 125, July 11, 1949, p. 100-101, 104.

Equipment performs at high speed on both ferrous and nonferrous stock. Component pieces of equipment comprising a continuous line are interlocked electrically and mechanically and provide automatic operation with a production approximately two and three times that obtained from conventional and continuous drawbenches, respectively.

19A-168. An Analysis of Blanking Die Designs. Part IV. C. W. Hinman. *Modern Machine Shop,* v. 22, July 1949, p. 110-112, 114, 116.

Construction and operation of sectional and inverted compound blanking dies.

19A-169. Strength and Failure Characteristics of Metal Membranes in Circular Bulging. W. F. Brown, Jr., and F. C. Thompson. *Transactions of the American Society of Mechanical Engineers,* v. 71, July 1949, p. 575-585.

Circular hydraulic bulges were formed from a group of materials having widely varying strain-hardening rates. The complete development of the shapes and strain distributions was determined experimentally, and stress and radius of curvature at the pole calculated as a function of maximum strain. Analysis revealed that strain gradients and bulge heights were influenced by stress-strain characteristics. Instability was exhibited by all materials having a sufficient ductility at strains varying from −0.47 for 75S-O to −0.64 for annealed low-carbon steel. Height and maximum strains (forming limits) obtainable in bulging were greatly reduced by the presence of surface flaws or a large grain size. 16 ref.

19A-170. La fabrication et le controle des fils de contact en aluminium-acier. (Fabrication and Inspection of Aluminum-Steel Trolley Wires.) Louis Albert. *Revue de l'Aluminium,* v. 26, May 1949, p. 178-181.

Specifications.

19A-171. Wire Loop-Forming Tool. Böthig. *Engineers' Digest,* v. 10, June 1949, p. 202. Translated from *Werkstatt und Betrieb,* v. 81, Dec. 1948, p. 367.

Described and illustrated.

19B—Ferrous

19B-115. Rolls and Rolling. Parts V and VI. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 37, May 1949, p. 543-549; June 1949, p. 698-704, 706.

Pass profiles for cross-country billet mills, finishing mills, and continuous mills. Relative merits of various combinations of shapes. (To be continued.)

19B-116. Safety Is a "Must" Factor in Propane Tank Manufacture. *Western Metals,* v. 7, June 1949, p. 24-25.

Manufacture of acetylene gas cylinders and containers for liquefied petroleum gas. Press forming, surface cleaning, and welding.

19B-117. Plastic Strain and Hysteresis in Drawn Steel Wire. R. S. Brown. *Journal of the Iron and Steel Institute,* v. 162, June 1949, p. 189-200.

None of the present tests is suitable for determining the properties of wire required to withstand dynamic stresses. Stress-strain characteristics at loads up to 75% of ultimate tensile strength. Effect of temperature during wire-drawing and relation to behavior of heat-treated wires subjected to combined bending and dynamic stresses.

19B-118. Production of Hot and Cold-Rolled Strip and Sheets. Charles L. McGranahan. *Steel,* v. 124, June 6, 1949, p. 106-108, 110, 112, 114, 117; June 13, 1949, p. 88-90, 92, 94, 96, 98, 101; June 20, 1949, p. 106-108, 110, 112, 114, 117.

Equipment and procedures for ferrous materials. First installment—tabular classifications of hot and cold rolled plates, bars, strip, and sheets. June 13 issue describes the trip of a slab through the scale breaker, roughing stands, finishing stands, run-out tables, coilers, and pilers of a modern continuous hot strip mill. Also the hot Steckel mill. In June 20 issue quality classifications for sheets, finishing of hot rolled sheets, sheet pickling, shearing lines, and the continuous pickling process. (To be continued.)

19B-119. Automation Principle Applied to Production of Axle Housings. Joseph Geschelin. *Automotive Industries,* v. 100, June 15, 1949, p. 34-36, 64.

Procedures and equipment for producing 2000 completely machined

rear-axle housings in an 8-hr. day. Automatic transfer and press operations are largely utilized.

19B-120. Pressless Dies Operate in Sequence. Cyril Bath. *American Machinist*, v. 93, June 16, 1949, p. 85.

Self-operated dies, first applied to forming refrigerator cases, now utilized in complex forming of dishwasher and other sheet parts.

19B-121. Progressive Dies Form House Panels. *Iron Age*, v. 163, June 16, 1949, p. 92.

Use by Lustron Corp.

19B-122. Hints on Forging. John E. Anderson. *Western Machinery and Steel World*, v. 40, June 1949, p. 75-77.

Practical recommendations.

19B-123. Fasteners Hold Everything. Price Berrien. *Western Machinery and Steel World*, v. 40, June 1949, p. 90-93.

Procedures and equipment for manufacture of a variety of bolts, screws, and nuts. Miscellaneous operations such as cold heading, heat treating, cleaning and finishing, thread rolling, carburizing, plating.

19B-124. Geneva Steel Converts Plate Mill. *Iron and Steel Engineer*, v. 26, June 1949, p. 76.

Conversion of 132-in. semicontinuous plate mill permits production of coiled, hot-rolled breakdowns as well as continued production of high-quality steel plates. Mill characteristics.

19B-125. Maximum Ingot Yield by Proper Planning. W. G. Smith. *Iron and Steel Engineer*, v. 26, June 1949, p. 96-99; discussion, p. 99.

Recommendations for each step between ingot and finished product.

19B-126. Crucible Opens New Mill at Midland, Pennsylvania. *Iron and Steel Engineer*, v. 26, June 1949, p. 120-122.

New hot and cold rolled sheet and strip mill designed for stainless and special-alloy steels.

19B-127. Die Polishing. *Wire Industry*, v. 16, June 1949, p. 487.

Procedures for polishing tungsten-carbide wire-drawing dies and importance of careful polishing to increase die life and improve quality of the products.

19B-128. Forging Crankshafts One Throw at a Time. H. Malcor. *Iron Age*, v. 163, June 23, 1949, p. 71-73.

"RR" method, developed in France, which utilizes rolled or forged bar stock. The operation involves one stroke of the press to upset the webs and displace the metal forming the pin. The use of smaller ingots, less machining, uninterrupted grain flow throughout the length of the shaft, and adaptability of equipment to a variety of crankshaft sizes are some of the advantages claimed.

19B-129. New Facility for Drawing Stainless Wire. *Steel*, v. 124, June 27, 1949, p. 82, 85-86.

Production of wire rounds ½-in. and finer.

19B-130. Hydraulic Presses Speed Electric Motor Assembly. *Steel*, v. 125, July 11, 1949, p. 98.

Use of the above in building traction motor armatures at Westinghouse. Two presses are employed in the armature core-building section to press armature laminations and commutators on the shafts.

19B-131. The Use of Phosphate Coatings in Wire, Tube, and Deep Drawing. H. A. Holden and S. J. Scouse. *Machinery* (London), v. 74, June 16, 1949, p. 803-805. A condensation.

Previously abstracted from *Sheet Metal Industries*. See item 19B-28, 1949.

19B-132. Production of Hot and Cold Rolled Strip and Sheets. Parts IV-VI. Charles L. McGranahan. *Steel*, v. 124, June 27, 1949, p. 66-68, 70, 73, 76; v. 125, July 4, 1949, p. 83-84, 86, 89-90, 92, 95; July 11, 1949, p. 106, 108, 111-112, 114, 116.

Part IV defines and discusses cold rolled carbon steel sheets and strip. Various types of mills used in production. Part V describes tandem units; annealing procedure and equipment. Part VI discusses temper rolling, shearing lines, stretcher leveling, inspection and oiling, porcelain enameling sheets, and the above. (To be continued.)

19B-133. To Die Forgings for Lower Costs. *Product Engineering*, v. 20, July 1949, p. 102.

Compares a conveyor shaft made by hammer die forging to one made by upset die forging. Also compares a cast and a drop-forged cover plate.

19B-134. American Steel and Wire Company Opens Stainless Division at Waukegan. *Iron and Steel Engineer*, v. 26, July 1949, p. 74-76, 78.

New mill equipped exclusively to process rounds ½ in. and smaller and certain sizes of flat stainless steel wire.

19B-135. Dry-Type Drawing Compounds for the Deep Drawing of Sheet Steel. R. W. Piper. *Finish*, v. 6, July 1949, p. 23, 46.

Advantages claimed over fluid lubricants.

19B-136. Fabrication, Metal Preparation, Enameling—Sinks, Bathtubs and Washing Machine Tubs. Part II. A Photo Story of Washing Machine Tub Production at Ingersoll Steel. *Finish*, v. 6, July 1949, p. 36-37.

19B-137. (Book). **Cold Shaping of Steel —Summary Report.** 138 pages. 1949. Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C. (Office of Technical Services, PB96704.) Photostat, $17.50; microfilm, $5.50.

Extensive new data on the cold extrusion of steel. Covers work done for the Army by Heintz Manufacturing Co. to adopt German-developed technology in this field to American production. An important section deals with development of efficient, automatic "phosphatizing."

19C—Nonferrous

19C-16. Stove Elements From Strip. *Canadian Metals and Metallurgical Industries*, v. 12, June 1949, p. 14-15, 32, 35.

Production of electric-range elements from Inconel by Moffats, Ltd., a Canadian range manufacturer. Press operations and welding.

19C-17. Triple-Draw Push-Pointing Drawbench for Tubes. *Engineering*, v. 167, June 3, 1949, p. 512-513, 516. A Triple Drawbench. *Engineer*, v. 187, June 3, 1949, p. 610-613.

Believed to be the first of its kind; installed recently by a British firm for the production of brass and copper tubes.

19D—Light Metals

19D-41. Types and Functions of Press Tools. 14. J. W. Lengbridge. *Tool Engineer*, v. 22, June 1949, p. 36-40.

Functions of four general types of press cutting tools: simple, multiple, progressive, and compound. Choice of tool and elements of design. (To be concluded.)

19D-42. Uber die Herstellung spannungskorrosionsbeständiger Werkstucke aus Al-Mg-Legierungen. (The Production of Stress-Corrosion-Resistant Parts From Al-Mg Alloys.) E. Mohr. *Archiv fur Metallkunde*, v. 3, Mar. 1949, p. 117-118.

Various heterogenization processes for Al-Mg alloys, especially the Siebel-Vosskuhler process; and difficulties of industrial heterogenization of the alloys containing about 6-7% Mg. Experiments made to meet these difficulties. A photomicrograph shows structures of an Al-Mg alloy in the rolled and in the annealed semi-hard state. Tensile-test data.

19D-43. Aluminum Foil Operations at Permanente Metals Corp. *Light Metal Age*, v. 7, June 1949, p. 10-11, 23.

Involves primarily cold rolling, annealing, and laminating.

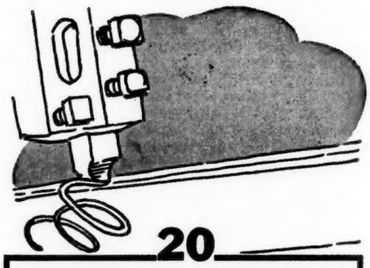
19D-44. Dies Make That Bulge in Cooker Pots. B. E. Schroeder. *American Machinist*, v. 93, June 30, 1949, p. 96-99.

How bulged sidewall of Hotpoint deep-well cooker shell is formed hydraulically with 2000-psi. pressure from intensifier in press base from 3S-O Al-alloy disks.

19D-45. Hot Forming Tests With Magnesium. Gilbert C. Close. *Modern Machine Shop*, v. 22, July 1949, p. 98-102, 104, 106.

Tests dealing with drop hammer and stretch press forming of hot magnesium sheet stock. Wider application of formed Mg parts is predicted as a result of the tests.

For additional annotations indexed in other sections, see:
2C-34; 7C-28; 9-192; 11-234; 21B-36; 21C-3; 25A-108



20 MACHINING and MACHINABILITY

20A—General

20A-256. Helical Gears Cut on "Solid Table" Machines. No. II. Distribution and Amount of Errors. S. A. Couling. *Engineer*, v. 187, May 27, 1949, p. 580-582.

Action of the hob when cutting the teeth in gear-wheel blanks. Sources of error which must be controlled to fine tolerances.

20A-257. Solving Compound Angle Problems. Jay N. Edmondson. *Tool Engineer*, v. 22, June 1949, p. 21-22.

Problems of milling and drilling. Original design, graphical solution and design of mill fixture, calculated solutions for accurate location of pins and bushings.

20A-258. Machine Tool Selection in the Turning Field. E. L. Murray. *Tool Engineer*, v. 22, June 1949, p. 24-28.

Workpiece geometry, material, and accuracy, personnel factors, and total production.

20A-259. Output Trebled by Tooling Changes. A. E. Rylander. *Tool Engineer*, v. 22, June 1949, p. 29.

Redesign of window-regulator arms and its effect on manufacturing economy.

20A-260. Gang Milling Fixture. Robert Mawson. *Tool Engineer*, v. 22, June 1949, p. 35.

Efficiency and design.

20A-261. Gadgets. *Tool Engineer*, v. 22, June 1949, p. 43-44.

"Punching Small Holes in Heavy Stock", Federico Strasser; "Holder for Reboring Washers", O. W. Anderson; "Chip Wiper for Carbide Cutters", A. S. Childs; "Drill and Tap Through One Bushing", Stanley R. Welling; and "Simple Cutter Grinder", Arthur R. Christensen.

20A-262. Hermes IV and Hastings. Part IV. Mainplane Construction and Assembly; Manufacture of Tail Surfaces. (Concluded.) S. C. Poulsen. *Aircraft Production,* v. 11, June 1949, p. 186-195.
Design of the mainplane units. Spar-boom machining and spar assembly, and the components are followed through to the later assembly stages. Tail-surface construction, and progress of the major units is traced through to final assembly.

20A-263. The Characteristics of Machined Surfaces. A. J. Chisholm. *Machinery* (London), v. 74, June 2, 1949, p. 729-736.
Factors affecting the roughness of cut surfaces produced by simple edge-cutting tools. Lubrication, surface deformation, and residual surface stresses.

20A-264. New Machines for Automotive Production. *Automotive Industries,* v. 100, June 15, 1949, p. 46-47, 64.
Several new honing machines.

20A-265. How to Choose and Use Portable Tools. Part 3. Selecting the Right Tool. H. P. Bailey. *American Machinist,* v. 93, June 16, 1949, p. 106-109.
Tools for the individual job without regard to the form of power supply used.

20A-266. Practical Ideas. *American Machinist,* v. 93, June 16, 1949, p. 111-116.
Includes the following: ball-supported toolholder follows piston-head cam (William Holmes); steadyrest jaws located before stock is chucked (Harold W. Cutting); reverse centers locate reamers for regrinding operations (Heinz Landauer); boring bar shifts diameter to cut tapered bore (Fred H. Lingenfelder); double-clamping fixture holds part for grinding (Paul H. Winter); shear blade ground on power table saw (Bernard Levowich); differential screws sharpen surface-gage accuracy (Carl S. Frank); drilling jig improves accuracy in working from layouts, prints (Allan B. Nixon); dimpled tubing locates itself for soldering job (Henry George); and other miscellaneous shop hints.

20A-267. Diagnosis of Machining Troubles. I. Single-Point, Flat and Circular Forming Tools. II. Multiple-Point Rotating Tools. *American Machinist,* v. 93, June 16, 1949, p. 127, 129.
In charted form.

20A-268. Chart for Number of Boring Cuts; Boring-Tool Design for Turret-Lathe Operations. *American Machinist,* v. 93, June 16, 1949, p. 131.
Two ½-page items. Chart application and diagrams for cast iron, bronze, and steel.

20A-269. Automatic Operation, Greater Precision Feature Latest Honing Machines. *Steel,* v. 124, June 20, 1949, p. 118, 136.
Several new machines.

20A-270. End Forming Machine; Novel Variation of Centreless Principle. Arthur Scrivener. *Microtecnic* (English Edition), v. 3, Mar.-Apr. 1949, p. 91-93.
New type of machine which is a variation of the conventional centerless grinder for grinding end profiles of a certain range of shapes not readily handled by ordinary types.

20A-271. The Truing Devices of the Chatwood Hob and Helical Spline Grinder. *Industrial Diamond Review,* new ser., v. 9, May 1949, p. 148-150.

20A-272. Added Thread Rolling Operation Produces Part Complete on One Machine. *Screw Machine Engineering,* v. 10, June 1949, p. 34-36, 38.
Method makes possible completion of part on one 1⅝-in. RB-6 spindle Acme-Gridley multiple-bar machine in 23.6 seconds.

20A-273. Turret Lathe Practice. E. L. Marray. *Screw Machine Engineering,* v. 10, June 1949, p. 39-44.
Two basic methods, forming and generating with single point tools, for machining tapered surfaces, contours with simple curves, or a combination of both on the hand-turret lathe.

20A-274. Increase Production on Chucking Job With Automatic Loading and Ejection. *Screw Machine Engineering,* v. 10, June 1949, p. 46-49.
Fabrication procedure for valve. Part is loaded into chuck using a manually loaded cross-slide magazine.

20A-275. Corrected Diameter Tables of 10-Degree Top-Rake Circular Tools for No. 2G Brown & Sharpe Automatics. Roy M. Spaulding. *Screw Machine Engineering,* v. 10, June 1949, p. 50-57.
Their application.

20A-276. Stock Ends. *Screw Machine Engineering,* v. 10, June 1949, p. 59.
"T-Slot Cleaner", Donald E. Wood; and "Slotting Problems", George Schrader.

20A-277. Centreless Grinding of Headed Pieces. *Aircraft Engineering,* v. 21, June 1949, p. 201.
How a monotonous operation may be eliminated and production increased by use of an automatic machine.

20A-278. Duplicating Equipment Builds Supersonic Models. Ralph G. Paul. *Western Machinery and Steel World,* v. 40, June 1949, p. 66-69, 106.
Equipment and procedures for production of highly precise wind-tunnel models.

20A-279. New Developments in Microhoning. Part I. The Process. Pat Qualtieri. *Western Machinery and Steel World,* v. 40, June 1949, p. 80-83, 106.
Process makes use of abrasive grit to shear stock from the surface processed. The way in which the grit is applied to the surface and the cutting action of the grit are said to be entirely different from those of grinding and lapping.

20A-280. Motor Drive and Speed Control for Machine Tools. Georg Schlesinger. *Machinery* (London), v. 74, June 9, 1949, p. 766-771.
Including calculation of effective cutting powers.

20A-281. Milling Supercharger Bucket Blades From Bar Stock. S. B. Fuerst. *Iron Age,* v. 163, June 23, 1949, p. 60-64.
Manufacturing sequence, inspection methods, tolerances, and production speeds, as well as some of the unusual machine setups.

20A-282. Grinder Produces Fine Flat Surfaces. H. F. Skillings. *American Machinist,* v. 93, June 30, 1949, p. 74-76.
Optically flat surfaces with low micro-inch finishes can be obtained with standard vertical-spindle surface grinders by proper wheel selection and technique.

20A-283. Practical Ideas. *American Machinist,* v. 93, June 30, 1949, p. 101-106.
Disappearing roller thread ground with off-pitch passes (G. Starre); lathe mills face cam with spring-loaded templet (Heinz M. Landauer); corner-grinding troubles avoided with sectional punch (Cliff Bossman); eccentric cutter mounting provides various radii (W. Francis); cylinder holds washers for multiple boring (O. W. Anderson); jig holds nuts for edge drilling (T. W. V. Morgan); crane bearing re-centered in crankshaft sleeve (Peter Cervelli); radius cut on planer with one head rotating the other (Edward Farrell); hardened buttons grip sides of drafted parts (Fred H. Lingenfelder); shaper rolls trade marks (Bernard Levowich); air-compressor switch has fast leveling action (Dennis D. Unruh); roller block locates castings (Robert Mery and Victor A. Ritz); milling tool locates, steadies, and separates flat stock (H. Moore); and other miscellaneous shop hints.

20A-284. Turret-Lathe Machining Times. *American Machinist,* v. 93, June 30, 1949, p. 117, 119, 121.
Three "Reference Book Sheets" consist of (1) "s.f.p.m. chart" for cutting of 13 ferrous and nonferrous materials with cemented carbide and nine with high-speed steel; (2) a feed-per-revolution chart for the same materials; and (3) a nomographic carbide vs. high-speed steel selection chart.

20A-285. How Link-Belt Produces Ball and Roller Bearings. D. I. Brown. *Iron Age,* v. 163, June 30, 1949, p. 58-63.
Methods and equipment. Manufacturing procedures for making various types of solid and split-bearing mounts and pillow blocks. Machine-shop operations and inspection procedures.

20A-286. Modern Equipment at Work. *Modern Machine Shop,* v. 22, July 1949, p. 184-186, 188, 190, 192, 194, 196.
Lathe converted to automatic by installation of automat; cylinder blocks processed in special-purpose machine; new technique applied to welding of 4-6% Cr pipe; circular form tools used for cutting grooves in bronze seals; and rotating carrier for handling coils of wire.

20A-287. Ideas From Readers. *Modern Machine Shop,* v. 22, July 1949, p. 198-200, 202-204, 206-207.
Height or surface gage and an interesting application to check crankshafts, H. C. Urbauer; device to hold short, cylindrical workpieces, A. H. Saychoff; contour milling arrangement, Aaron H. Shum.

20A-288. Converting Machines to the Use of Carbides. *Iron Age,* v. 164, July 7, 1949, p. 89.
Conversion of a 31-year-old planer type miller. Operating results.

20A-289. How to Choose and Use Portable Tools. Part 5. Selecting the Power Supply. H. P. Bailey. *American Machinist,* v. 93, July 14, 1949, p. 120-123.
Described and illustrated.

20A-290. Practical Ideas. *American Machinist,* v. 93, July 14, 1949, p. 124-128.
Includes the following: angled forming toolbit slices parts without chatter (J. A. Waller); sphere-turner features quick radius adjustment (R. B. Wolverhampton); weld button cuts brittleness (G. C. Farrington); stepped templet gage centers holder for edge-turning (F. G. Forquer); reciprocating tool in adapter cuts radii on shaper (Victor Melendez); carbide tool-bit pressed into steel shank (Roger Vicaire); and other miscellaneous shop hints.

20A-291. Mechanics of Formation of the Discontinuous Chip in Metal Cutting. Michael Field and M. E. Merchant. *Transactions of the American Society of Mechanical Engineers,* v.

71, July 1949, p. 421-428; discussion, p. 428-430.

Geometry, mechanics of formation, and plasticity conditions for the "continuous" type of chip have previously been analyzed in detail. Formulates a similar analysis for the "discontinuous" type of chip. 10 ref.

20A-292. Form-Grinding of Internal Surfaces. G. H. De Groat and P. J. Koelbel. *Machinery* (London), v. 74, June 16, 1949, p. 807-809.

Improved method used by J. & S. Tool Co., in the U. S., which results in greater accuracy in grinding internal tangential forms.

20A-293. Air-Operated Chucking Devices for Lathe Applications. Harry L. Stewart. *Product Engineering,* v. 20, July 1949, p. 128-129.

The universal power chuck, compensating air chuck, air-operated chuck and tail stock, collet-type chuck, mandrel-type chuck, and double-jaw mandrel chuck.

20A-294. New Principle Improves Abrasive Belt Grinding. *Production Engineering & Management,* v. 24, July 1949, p. 44-46.

An integral roll grinder incorporates a new grinding principle. An abrasive belt traversing a master roll is used to achieve exceptional accuracy with fine surface finish.

20A-295. The Machining of the Dynaflow Transmission. Fred C. Pyper and A. G. Mac Dougall. *Machine and Tool Blue Book,* v. 45, July 1949, p. 63-68, 70, 72, 74, 76, 78, 80.

The above has a total of 354 different parts, most of them machined to close tolerances. Interesting machining problems.

20A-296. New Face Grinder Employs Unusual Principle. William F. Schleicher. *Machine and Tool Blue Book,* v. 45, July 1949, p. 97-100, 105-106.

A special grinding head gives compound movement from one bearing and permits loading of one station while grinding on another.

20A-297. The Use of Inclinable Punch Presses. (Continued.) J. I. Karash. *Tool & Die Journal,* v. 15, July 1949, p. 46-48, 50.

The inclined press, basic types of materials and press operation, die design for inclinable presses, and multiple-bar exposed knock-out.

20A-298. Gorton No. 2-28B Horizontal Mill Features Extreme Rigidity and Power. *Tool & Die Journal,* v. 15, July 1949, p. 52-53, 55.

The above milling machine and its operation for heavy-duty production work.

20A-299. New Low-Priced Cylindrical Precision Grinder. *Tool & Die Journal,* v. 15, July 1949, p. 62.

A simple, flexible cylindrical grinder which can be used for small-lot manufacturing purposes in small or large shops and toolrooms.

20A-300. The Evolution of Machine Tools. A Plea for Simplicity. James F. Driver. *Machinery Lloyd* (Overseas Edition), v. 21, June 18, 1949, p. 86-93.

Position of cutting tools, bearings, future developments, machine and workpiece, and roughing and finishing.

20A-301. A Versatile Universal Grinding Machine. *Machinery Lloyd* (Overseas Edition), v. 21, June 18, 1949, p. 94-99.

The Jones and Shipman hydraulic grinding machine, model 1001, its controls and operation.

20A-302. Internal Resonance. One of the Principal Causes of Machining Vibrations. L. B. Ehrlich. *Engineers' Digest,* v. 10, June 1949, p. 201-202. Translated and condensed from *Stanki i Instrument* (Machine Tools and Instruments), No. 1, 1949, p. 20-22.

Mathematical analysis of the above.

20A-303. Monarch Template-Controlled Roll Turning Lathe. *Machinery* (London), v. 74, June 23, 1949, p. 842-843.

Advantages of the machine.

20A-304. Finroc Gear Shaving Machines for Large Spur and Helical Gears. *Machinery* (London), v. 74, June 23, 1949, p. 859-861.

New method for finishing straight spur and single and double helical gears, which removes completely undulations formed in helical gear teeth cut by the hobbing process, and is claimed to result in a greater degree of correction in errors of profile, pitch, helix angle, and surface finish.

20A-305. Errors of Single-Start Hobs for Involute Gears as Used in Precision Instruments and Their Influence on the Generated Tooth Shape. Herbert Göttsching. *Microtecnic.* (English Edition), v. 3, Mar.-Apr. 1949, p. 72-78. Translated from the German.

Detailed analysis, illustrated by diagrams. (To be continued.)

20A-306. (Book). **Technical Metalcraft for Schools.** J. R. Ferguson. 92 pages. B. T. Batsford, Ltd., 15 North Audley St., London, W. 1, England. 7s, 6d. net.

The first four chapters deal with measuring and marking out, hand-tool operations, heat treatment of carbon steel, and machine-tool operation (drilling, turning, and shaping). The fifth and final chapter contains 20 practical exercises for bench and machine tool work in a graduated sequence of practical complexity, with detail and assembly drawings.

20B—Ferrous

20B-84. Machining Properties and Wear of Milling Cutters. (In English.) Olov Svahn. *Acta Polytechnica* (Mechanical Engineering Series), v. 1, no. 7, 1949, 104 pages.

Investigations were made on machining of steel with cylindrical milling cutters. Variable cutting force was measured with capacitive equipment and photographically recorded. 57 ref.

20B-85. Milling Cutter Design and Operation. Part One. Mario Martellotti. *Tool Engineer,* v. 22, June 1949, p. 17-20.

Types of milling cutters, cutting materials and fluids, tooth-and-chip space, cutting angles, and rake angle.

20B-86. Alternating Milling Setup Turns Out Gear Blanks Continuously. Paul Bludau. *American Machinist,* v. 93, June 16, 1949, p. 103.

For tractor steering mechanisms.

20B-87. Broaching Fixture Accommodates Six Different Parts. Elmer Neuman. *American Machinist,* v. 93, June 16, 1949, p. 104-105.

Novel fixture with permanent locator stations mounted on an indexing faceplate, used on a 15-ton horizontal broaching machine which has reduced setup time to a minimum.

20B-88. Broaching Steering Knuckles. *Iron Age,* v. 163, June 16, 1949, p. 83.

Solution of problem of broaching two well separated bores accurately in line in forged-steel steering knuckles.

20B-89. Danger—High Voltage! Paul Graham. *Western Machinery and Steel World,* v. 40, June 1949, p. 70-74.

Production of high-voltage circuit-breaker mechanisms, using press and machine-shop equipment.

20B-90. "Crush-Dressing" Technique Used in Production. *Western Machinery and Steel World,* v. 40, June 1949, p. 84-85.

Equipment and procedure developed to make meshed cutting wheels of precise dimensions, of 12 in. diam., and having 660 teeth each. The wheels are used for manufacture of aluminum window screen of the venetian-blind type by rolling sheet through a gang of the wheels.

20B-91. Big Jobs From Portland's Shops. Hal Cooley. *Western Machinery and Steel World,* v. 40, June 1949, p. 88-89.

Large-sized machining jobs.

20B-92. Contour Roll Turning. S. A. Brandenburg. *Iron and Steel Engineer,* v. 26, June 1949, p. 83-85; discussion, p. 85.

New roll lathe uses a thin sheet-metal templet and follower to guide the cutting tool.

20B-93. The Production of Gears for the Standard Vanguard. *Machinery* (London), v. 74, June 9, 1949, p. 759-764.

Procedures and equipment for British car.

20B-94. Broaching Automotive Door Hinges. *Iron Age,* v. 163, June 23, 1949, p. 81.

20B-95. Unusual Turning Jobs Performed on Lathes, Using Proper Tool, Mounting and Suitable Fixture. Herbert Chase. *Steel,* v. 124, June 27, 1949, p. 65, 94.

Two unusual lathe jobs performed in fabricating components for hay balers. One is machining a track cam of irregular contour; the other turning the crank pin.

20B-96. Don't Fear Threading of Stainless. J. J. Robert. *American Machinist,* v. 93, June 30, 1949, p. 71-73.

High output rates and uniform quality may be obtained by careful selection of equipment and tool materials and special attention to operator training.

20B-97. Radiator Sections Machined Automatically. Walter Rudolph. *American Machinist,* v. 93, June 30, 1949, p. 77.

Special machines which face, ream, and tap gray-iron radiator castings. An air blast removes chips.

20B-98. Latest Practices in Making Rear Axles. Joseph Geschelin. *Automotive Industries,* v. 101, July 1, 1949, p. 24-27, 62.

Equipment and procedures used by Eaton Mfg. Co.'s Axle Div. Modern transfer machines, automatic lathes, automatic loading devices, and a huge broach for internal gears are among the equipment used.

20B-99. Smart Tools Bore Heavy Cylinders. J. F. Stevenson. *American Machinist,* v. 93, July 14, 1949, p. 94-95.

Application of the split-pilot principle to a turret lathe set-up enables production tolerances of 0.002 in. to be maintained on deep-hole boring of high-tensile iron cylinder liners. Bores are being machined with only one rough and one finishing cut.

20B-100. Influence of Steel Hardness in Face-Milling. J. B. Armitage and A. O. Schmidt. *Transactions of the American Society of Mechanical Engineers,* v. 71, July 1949, p. 413-419.

Results of face-milling tests on seven different kinds of steels for power consumption and tool life at hardnesses of approximately 200, 300, and 400 Brinell. At any given hardness, power requirements varied but little, but differences in tool life were considerably greater. The hardness of steel can be used as a guide in choosing preliminary values of cutting speed and feed. Photographs illustrate development

of wear on a tungsten-titanium carbide milling tooth when milling steel of 200, 300, and 400 Brinell hardness.

20B-101. Constant-Pressure Lathe Test for Measuring the Machinability of Free-Cutting Steels. F. W. Boulger, H. L. Shaw, and H. E. Johnson. *Transactions of the American Society of Mechanical Engineers,* v. 71, July 1949, p. 431-438; discussion, p. 438-446.

A machinability testing method developed during a cooperative research program at Battelle Memorial Institute sponsored by Carnegie-Illinois Steel Corp. The test evaluates materials on the basis of the feed resulting from a fixed horizontal tool pressure. Its advantage is that it requires only a short testing time. The method is sensitive and gives adequate reproducibility. 10 ref.

20B-102. Rear Axle Housing Production. *Machinery* (London), v. 74, June 16, 1949, p. 795-802.

Machine-shop methods and equipment used by British firm.

20B-103. Buick's New Setup for Tripled Dynaflow Production. Joseph Geschelin. *Automotive Industries,* v. 101, July 15, 1949, p. 26-29, 56.

Some recently developed equipment and procedures, including selective flame hardening of the hub, several machining operations, and assembly.

20B-104. High Speed Automatic Broaching. *Automotive Industries,* v. 101, July 15, 1949, p. 41.

Broaching of splines on automobile window-regulator crankshafts at the rate of 1500 per hr. using a Denison oil-hydraulic Multipress equipped with an automatic indexing table.

20B-105. Special Machine for Drilling and Tapping Cross Members. *Automotive Industries,* v. 101, July 15, 1949, p. 44.

Unusual example of the application of automatic methods for the machining of large and unwieldy parts with locating surfaces at odd angles. It consists of the drilling and tapping of passenger-car-frame front cross-members composed of welded steel stampings.

20B-106. Chuck Pinions Sliced From Cold Drawn Stock. *Product Engineering,* v. 20, July 1949, p. 101.

Substitution of pinion-rod sections for machine-cut pinions in the Wahlstrom automatic drill.

20B-107. Close Tolerances Held on Bull Gears. *Production Engineering & Management,* v. 24, July 1949, p. 43.

Machining of turbine-driven ship bull-gear at Westinghouse's Sunnyvale, Calif., plant.

20B-108. Machining Heavy Workpieces on Relatively Light Machine Tools. *Machinery* (London), v. 74, June 23, 1949, p. 840-841.

Shows possibility by suitable adaptation and choice of speeds and feeds, of successfully precision machining comparatively large batches of work. As an example, the complete machining of forged steel connecting rods for marine diesel engines is described.

20B-109. Indexing Press Tool for Piercing Louvres. *Machinery* (London), v. 74, June 23, 1949, p. 846-847.

Use of a Taylor & Challen No. 1632 ratchet gear piercing press for piercing louvres in a mild steel air-cleaner top cover.

20C—Nonferrous

20C-14. Auto-Feed Loads Couplings Into Headstock Chuck. George E. Fogarty. *American Machinist,* v. 93, June 16, 1949, p. 92.

Procedure.

20C-15. Circular Form Tools Speed Production. *Western Machinery and Steel World,* v. 40, June 1949, p. 103.

Use for manufacture of grooved bronze labyrinth seals for steam turbines.

20D—Light Metals

20D-14. Machining the Vanguard Clutch Housing and Gearbox. *Machinery* (London), v. 74, June 2, 1949, p. 723-728.

Methods employed for machining the above Al-alloy casting.

For additional annotations indexed in other sections, see:
7D-36; 14A-89; 21B-36

21A—General

21A-36. Simplified Tooling With Plastic Laminate. Harry Wilkin Perry. *Aircraft Engineering,* v. 21, June 1949, p. 193-195.

Economical method of tooling. Molding the tools of low-pressure plastic laminate, instead of making them of metal, effected an average time saving of 60% and resulted in savings of more than $100,000 during the first full year the method was employed. Fiberglas woven fabric and resins of the low-pressure, thermosetting type for impregnating the fabric are used for a variety of jigs and fixtures for miscellaneous fabrication processes.

21A-37. How to Choose and Use Portable Tools. Part 4. Standard and Semi-Standard Tools. H. P. Bailey. *American Machinist,* v. 93, June 30, 1949, p. 91-93.

Miscellaneous applications in the machine-shop, foundry, and elsewhere in fabrication and assembly operations.

21B—Ferrous

21B-36. The Manufacture of Coil Springs Under Completely Mechanized Conditions. *Wire and Wire Products,* v. 24, June 1949, p. 506, 527.

Operations include grinding, automatic handling, swaging, coiling, quench hardening, normalizing, shot peening, painting, and testing.

21B-37. Making Bearing Swivels Proves "Big Business". Thomas A. Dickinson. *Western Metals,* v. 7, June 1949, p. 34-35.

Procedures.

21B-38. One 100-lb. LP-Gas Cylinder a Minute. Will C. Grant. *Industrial Gas,* v. 27, June 1949, p. 11-12, 24.

Fabrication of the above as well as 20-in. gas-line pipe. Application of gas furnaces in the process.

21B-39. How Link-Belt Produces Ball and Roller Bearings. D. I. Brown. *Iron Age,* v. 163, June 23, 1949, p. 74-80.

Manufacturing methods used, with particular emphasis on material used, heat treatment, tooling, coolants, grinding methods, and gaging.

21B-40. Production Use of Boron Steel. *Iron Age,* v. 163, June 23, 1949, p. 82. Condensed from paper by F. J. Robbins and J. J. Lawless.

Development of one particular boron-steel analysis and its evaluation on the basis of various production operations such as forging, hot forming, machining on automatic screw machines, and standard heat treatment encountered in volume-production operations. Standard hardenability, tensile, and impact tests.

21B-41. Plant Modernization Program Boosts Output of Ironers. *Production Engineering & Management,* v. 24, July 1949, p. 49-56.

Working, machining, welding, and finishing processes incorporated in ironer production.

21C—Nonferrous

21C-3. Rolled Metals, Tubes and Sections. *Metal Industry,* v. 74, June 17, 1949, p. 479-482.

Brass and copper casting, extrusion, and piercing, tube drawing, cold rolling, metal cleaning, and precision rolling.

21D—Light Metals

21D-8. Manufacturing and Physicals of Aluminum Go Hand-in-Hand. *SAE Journal,* v. 57, June 1949, p. 62-64. Based on "The Design of Aircraft Structure for 'Mass Production'" by O. A. Wheelon, to be printed in full in *SAE Quarterly Transactions.*

Current aircraft design trends and their influence on physical properties.

21D-9. Manufacturing Three-Dimensional Aluminum Letters. *Light Metal Age,* v. 7, June 1949, p. 16-17.

Fabrication processes. Letters are said to be sturdy, attractive, and economical.

For additional annotations indexed in other sections, see:
22B-219

22A—General

22A-136. Report of Committee D-14 on Adhesives. *American Society for Testing Materials,* Preprint 64, 1949, 7 pages.

Tentative test method for cleavage strength of metal-to-metal adhesives.

22A-137. Cutting Torch of Unusual Design; Possible Fuel Gas Economies. L. A. Hodges and E. Bishop. *Welding,* v. 17, June 1949, p. 242-247.

The heat generated in the burning metal is partially utilized making possible substantial reduction in gas consumption, averaging 57%. Data for various combinations, show savings of 53-67% propane or 30-55% acetylene, and 4-12% oxygen, over a standard torch.

22A-138. American Fabrication Practice; Some Comments on Production Methods. E. G. Semler. *Welding,* v. 17, June 1949, p. 260-264.

Deals mainly with welding methods.

22A-139. Flash and Upset Butt-Welding. E. J. Del Vecchio. *Tool Engineer,* v. 22, June 1949, p. 32-34.

Speed vs. strength, stock loss, standardization of machine sizes, and carbon vs. weldability.

22A-140. Sound Welding. Simon A. Greenberg. *Welding Journal,* v. 28, June 1949, p. 526-530.

Standardization and code activities of American Welding Society.

22A-141. Jig for Tacking Cylinder Girth Seams. H. A. Huff, Jr. *Welding Journal,* v. 28, June 1949, p. 560.

22A-142. Designing for Welding. Part VI. Wallace A. Stanley. *Welding Journal,* v. 28, June 1949, p. 561-562.

Typical applications of projection welding. A "wrong" design is compared with a better one to emphasize importance to cost and quality.

22A-143. This Thing Called Weldability. *Welding Journal,* v. 28, June 1949, p. 246s-264s.

Present knowledge, basis for future research and development, and methods of improved application of present test procedures.

22A-144. The Porosity of Welds. J. ter Berg and G. J. van Wijnen. *Welding Journal,* v. 28, June 1949, p. 269s-271s.

Distinction between sulfur-sensitive and sulfur-insensitive welding electrodes.

22A-145. Final Report: Weld Stress Committee. E. Chapman. *Welding Journal,* v. 28, June 1949, p. 271s-274s.

General conclusions on effects of welding during the process of making and coating of the weld at ambient temperature. Specific projects

22A-146. Welding in Aircraft Construction; A Record of Application and Development. G. B. Evans. *Aircraft Production,* v. 11, June 1949, p. 200-203.

30 ref.

22A-147. Hows and Whys of Induction Soldering. Frank W. Curtis. *American Machinist,* v. 93, June 16, 1949, p. 77-81.

Speeds joint completion and localizes heat. Cleanliness, type of joint, solder, flux, coil design, and material characteristics.

22A-148. Schweisselektroden. (Welding Electrodes.) W. Hummitzsch. *Schweisstechnik,* v. 1, Sept. 1947, p. 1-4.

Chemical compositions, physical properties, and uses of different types of electrodes.

22A-149. Grundsätzliches uber Schrumpfungen und Schrumpfspannungen. (Principles of Shrinkage and Shrinkage Stresses.) Friedrich Ostreicher. *Schweisstechnik,* v. 1, June 1947, p. 1-4; Oct. 1947, p. 5-7.

The magnitudes of shrinkages and stresses caused by welding can be determined by a simple calculation: the transverse shrinkage of a seam, and the effect of the temperature and of the size of the welded piece on the magnitude of shrinkage and stress.

22A-150. "Dot-Welder" Ideal Repair Tool. *Canadian Metals and Metallurgical Industries,* v. 12, June 1949, p. 30.

Commercial equipment and its applications. Having a depth of penetration of only 1/32 in., the air-pressure unit of the pistol quenches the electrode and arc in a constant stream of cooling air. A patented feature eliminates danger of high heat being developed in the base metal, thereby eliminating the possibility of heat distortion and residual stresses.

22A-151. Resistance Welding; A Survey of Present-Day Practice and Machine Developments. *Automobile Engineer,* v. 39, June 1949, p. 223-230.

Recent machines designed and manufactured by a British firm illustrate the most modern trends in machine design. Three-phase, balanced-load resistance welding.

22A-152. Manual Hidden Arc Welding Applied Advantageously to General Manufacturing Operations. W. R. Persons. *Steel,* v. 125, July 4, 1949, p. 96, 98.

Application to various operations by different companies throughout the country.

22A-153. Dauerstandfestigkeit von Weichlotnähten. (Creep-Stress Resistance of Soft-Solder Joints.) Peter Grassmann. *Zeitschrift fur Metallkunde,* v. 40, Apr. 1949, p. 156.

Experimental graph for a soldered joint using a 42.8% Zn, Pb-Zn solder. Results are discussed and the literature briefly reviewed. Effect of increasing the Zn content to 60% is indicated.

22A-154. Gunstigste Flammeneinstellungen fur schweissbare Stählelegierungen und Nichteisenmetalle. (Optimum Flame Adjustments for Weldable Steel Alloys and Nonferrous Metals.) C. G. Keel and P. Degen. *Zeitscrift fur Schweisstechnik; Journal de la Soudure,* v. 39, June 1949, p. 108-111.

In tabular form.

22A-155. Balanced Waves for Inert-Arc Welding. Part One. R. F. Wyer. *Welding Engineer,* v. 34, July 1949, p. 24-27.

Why the inert-arc process attempts to change alternating into direct current. Methods for avoiding annoying tendency toward current rectification. (To be continued.)

22A-156. Brazing as a Production Process. S. C. Churchill. *Machinery* (London), v. 74, June 23, 1949, p. 835-839.

Advantages and limitations of copper brazing in fully controlled, automatic furnaces. Atmospheres used for brazing, design of parts, strength of brazed joints, use of steel and copper laminations, and brazing of Ni-Cr steel.

22A-157. (Book) **Praktisches Handbuch der gesamten Schweisstechnik. Erster Band. Gasschweiss- und Schneidtechnik.** (Practical Handbook of the Welding Techniques. Vol. I. Gas Welding and Cutting.) Ed. 4. Paul Schimpke and Hans A. Horn. 400 pages. 1948. Springer-Verlag, Berlin, Germany.

Deals with the entire field of welding, including metallography of weldable metals; nature and composition of the gases and gas mixtures; welding equipment; different types of welding joints; expansion, contraction, warping, and phase transformations of the metals during welding.

22B—Ferrous

22B-218. Notes on the Weldability and Mechanical Properties of Manganese-Vanadium Plate Steel. Part I. T. W. Merrill. *Vancoram Review,* v. 6, no. 1, [1948], p. 7-9, 14-15.

Results of welding tests made on 1-in. plates. Two common methods of welding: the submerged-arc process and the manual, shielded-metal arc process. (To be continued.)

22B-219. Motor Car Production. 4. Assembly of the Morris Minor at the Birmingham Works of the Nuffield Organization. *Welding,* v. 17, June 1949, p. 232-241.

Metal-joining procedures and equipment used in production of above British car.

22B-220. Fabrication at B.T.H. (Continued.) T. Holme and H. H. Reeve. *Welding,* v. 17, June 1949, p. 252-259.

Weld fabrication of a wide range of heavy electrical equipment.

22B-221. Boiler Reconditioning; Some Developments of Butt Design. J. K. Johannesen. *Welding,* v. 17, June 1949, p. 265-267.

Changes in butt-weld design.

22B-222. Welding Galvanized Pipe. H. E. Simkins. *Welding Journal,* v. 28, June 1949, p. 562.

Metallic-arc welding of a galvanized-iron exhaust stack approximately six stories in height and 36 in. in diam.

22B-223. How to Weld Sheet Steel. Part I. Oxy-Acetylene Welding. K. H. Koopman. *Welding Journal,* v. 28, June 1949, p. 563-566.

Method for making butt, flange, and corner welds in steel up to ⅛ in. thick.

22B-224. Fatigue of Welded and Riveted Trusses. C. Cerardini. *Welding Journal,* v. 28, June 1949, p. 241s-245s. Translated from *Journal de la Soudure,* v. 38, 1948, p. 199-203, 228-231.

Fatigue and static tests for comparing welded and riveted trusses. Design diagrams.

22B-225. Production Welding. *SAE Journal,* v. 57, June 1949, p. 25-27. Based on "Welding Applications in Automotive Construction" by John F. Randall.

Newly developed high-speed multiple-transformer resistance welders which have speeded welding of automotive assemblies at minimum cost.

22B-226. Life for Colombia's Dredges. G. B. Wood. *Mining World,* v. 11, June 1949, p. 37-40.

Reconditioning of dredge parts by use of Ni-Mn welding rod permits lower cost operation and prolongs life of bucket lines.

22B-227. How to Weld a Wheel. *American Machinist,* v. 93, June 16, 1949, p. 101.

Redesigning program developed by The Towner Mfg. Co.

22B-228. Werkstoff- und Spannungsfragen bei Entwurf und Herstellung geschweisster Bauteile und Bauwerke. (Problems of Material and Stress in the Design and Production of Welded Structural Parts and Structures.) Hans Melhardt. *Schweisstechnik,* v. 1, May 1947, p. 1-10.

A general discussion on the composition of materials and on welding methods, as they affect the strength properties of structural steel. Strength test and other data.

22B-229. Verschleissfeste Auftragschweissungen auf Stahl und Stahlguss. (Application of Wear-Resistant Deposits on Steel and Steel Castings by Welding.) W. Schnurer. *Schweisstechnik,* v. 1, May 1947, p. 10-11; June 1947, p. 6-7.

Repair of worn machine parts and increasing the life of new machine parts by deposition of hard materials on the parts subject to wear.

22B-230. Wärmetechnik und ihre Anwendung beim Schweissen von Stahlblech. (Heat Technique and Its Use in the Welding of Sheet Steel.) V.

Trunschitz. *Schweisstechnik,* v. 1, Dec. 1947, p. 1-4.

Effect of heat (expansion, shrinkage, and warping) on the article to be welded. Methods of avoiding the undesirable effects of heat. (To be continued.)

22B-231. Spot Weld Assembly Improves Cabinets at Lyon Metal Products. *Modern Industrial Press,* v. 11, June 1949, p. 48, 50.

Use of resistance welding in place of nuts, bolts, and rivets to improve quality and reduce costs. Production procedure and advantages.

22B-232. Oxy-Acetylene Flames Help Make Coal Loaders. Harry Vogelpohl. *Mechanization,* v. 13, June 1949, p. 108-109.

How flame cutting minimizes machining in the production of mechanical coal-loading machines.

22B-233. Continuous Salt Bath Furnace for Brazing Chairs. *Machinery* (London), v. 74, June 9, 1949, p. 764-765.

22B-234. Welded Bridges in New South Wales, Australia. V. Karmalsky. *Engineering,* v. 167, June 10, 1949, p. 529-532. A condensation.

Their construction. (One of the prize-winning papers in recent J. F. Lincoln Arc-Welding Foundation contest.)

22B-235. Welding Compressor Shells. *Iron Age,* v. 163, June 23, 1949, p. 65, 70.

Procedures and equipment used by Westinghouse Electric Corp., East Springfield, Mass., for assembly of refrigerator compressor shells from SAE 1010 deep-drawing stock.

22B-236. Gas-Shielded Arc Welds Stainless Cups. Clarence Root. *American Machinist,* v. 93, June 30, 1949, p. 94-95.

Mechanized setups which produce straight and circular joints that require a minimum of polishing on 14-gage steel. For milking-machine cups.

22B-237. Lustron's Spot-Welded Homes. Clyde B. Clason. *Welding Engineer,* v. 34, July 1949, p. 17-23.

Fabrication processes, with emphasis on welding procedures; plant and personnel; features of the home.

22B-238. New Shoes Not Needed. Howard C. Close and E. J. St. Eve. *Welding Engineer,* v. 34, July 1949, p. 28-29.

Overlaid roller-bearing shoes adopted by the Missouri Pacific Railroad Co. Deposit is an Al-Fe-Cu alloy having high hardness and tensile strength combined with wear and corrosion resistance. Results are much more satisfactory than with the previous use of an Al bronze overlay tack welded to the cast-steel shoe. Welding procedure.

22B-239. Heavy Cutting. L. P. Elly. *Welding Engineer,* v. 34, July 1949, p. 34-38, 40.

Uses in a steel mill, installation requirements, cutting stations, torches and operations, the oxygen lance, shape cutting a 30-in. block and cranks 28 in. thick, and precision cutting.

22B-240. Weldment Replaces Cast Cylinder. Ray Bloomberg. *Welding Engineer,* v. 34, July 1949, p. 42, 44.

Describes fabrication of a first intermediate-pressure cylinder from welded plate for the SS Edward Chambers.

22B-241. Arc Welding Plus Imagination Halves Maintenance Costs. J. B. Cotter. *Power,* v. 93, July 1949, p. 81-83.

How arc welding converted an old economizer into a modern unit at half the replacement cost.

22B-242. Tube Welding Processes and Machinery Contribute to 10-Fold Production Increase. *Steel,* v. 125, July 11, 1949, p. 120.

Processes and plants of the Michigan Steel Tube Products Co.

22B-243. Aluminum Welding Fixture Is Easy to Handle. W. S. Hansen. *American Machinist,* v. 93, July 14, 1949, p. 98.

Fixture used for assembling Alemite lubrication units for the automotive service industry by arc or spot welding.

22B-244. Big Scoop (Welded of Course). *Industry and Welding,* v. 22, July 1949, p. 26-29, 74-76.

Special emhpasis is given to joint design, selection of proper type electrodes, and welding procedures in construction of 45-cu. yd. power-shovel dipper.

22B-245. What's Wrong With Welding Codes? Part II. (Concluded.) L. K. Stringham. *Industry and Welding,* v. 22, July 1949, p. 30-32, 34, 36.

Shows how sound welds often fail and unsound welds pass the guided bend test. Maintains that many good welders are disqualified unfairly and suggests specific revision of the existing code requirements.

22B-246. Tips on Hardsurfacing. II. M. Riddihough. *Industry and Welding,* v. 22, July 1949, p. 48-49, 51, 62-64.

Practical information on design of the weld deposit. Specific examples are digger teeth, hammers, conveyors, and hot and cold shear blades.

22B-247. Longest Tunnel Gets Welded Rail. *Railway Engineering and Maintenance,* v. 45, July 1949, p. 667-669.

Great Northern project. How the rail is being welded, tested to detect flaws, coated with a preservative, and laid.

22B-248. Susceptibility to Welding Cracking, Welding Sensitivity, Susceptibility to Welding Seam Cracking, and Test Methods for These Failures. K. L. Zeyen. *National Advisory Committee for Aeronautics,* Technical Memorandum 1249, June 1949, 35 pages.

Methods used in Germany just prior to the Second World War for determining susceptibility to weld cracking and to weld-seam cracking of steel. No satisfactory method was found for determining welding sensitivity. 31 ref.

22B-249. Bolzenschweissung mit Hilfe des elektrischen Lichbogens ohne Materialzusatz; Le soudage de goujons a l'arc electrique sans matiere d'apport. (Electric Arc Stud Welding Without the Deposition of Materials.) Hugo Hess. (In both German and French.) *Zeitschrift fur Schweisstechnik; Journal de la Soudure,* v. 39, June 1949, p. 100-107.

Method and apparatus.

22B-250. Beitrag zur Hartlötung von Baustahl mit Kupfer-Phosphorlot. (Hard Soldering of Structural Steel With Copper-Phosphorus Solder.) Friedrich Erdmann-Jesnitzer. *Metall,* v. 3, June 1949, p. 186-187.

Experiments on the hard soldering of carbon steel using a 6% P copper wire. Photomicrographs show joint structures.

22B-251. Pressure Welding Speeds Production of Tractor Parts. *Product Engineering,* v. 20, July 1949, p. 103.

The above plus change in type of steel resulted in faster production and lower cost on front-idler and track-roller shafts.

22B-252. High Production of Small Compressors. Part I. Paul M. Giles. *Industry and Welding,* v. 22, July 1949, p. 40-42, 46.

A combination of the three major welding methods, together with efficient handling practices, increases production of compressors for household refrigerators.

22B-253. Soo Line Builds All-Welded Gondolas. L. R. Vassick. *Railway Mechanical Engineer,* v. 123, July 1949, p. 384-389.

Procedure and equipment for building cars.

22B-254. Some Thoughts on Improving Flame Cutting Operations. Part I. *Machine and Tool Blue Book,* v. 45, July 1949, p. 109-115.

Some hints on technique. (To be continued.)

22B-255. Multiple Head Four-Point Projection Welder. *Machinery Lloyd* (Overseas Edition), v. 21, June 18, 1949, p. 100.

A special multiple projection welder recently designed for welding hat-shaped clips on surface panels of doors of electric ranges.

22C—Nonferrous

22C-18. Details of Some Interesting Manufacturing Operations at Ascot Gas Water Heaters Ltd. J. Moore and H. Penfold. *Sheet Metal Industries,* v. 26, May 1949, p. 1005-1007, 1014.

Some brazing operations. (To be continued.)

22C-19. Getting Ready to Bronze Weld. K. H. Koopman. *Welding Journal,* v. 28, June 1949, p. 568.

Cleaning and joint preparation.

22C-20. Details of Some Interesting Manufacturing Operations at Ascot Gas Water Heaters Ltd. (Continued.) W. Walters and E. Amis. *Sheet Metal Industries,* v. 26, June 1949, p. 1251-1254.

Forming operations, hot-dip finishing, soldering, forming and piercing, pressure testing, and assembly. (To be continued.)

22C-21. Welding Dissimilar Metals. *Product Engineering,* v. 20, July 1949, p. 101.

Use of resistance welding for joining tungsten contact disks to steel vibrator springs.

22D—Light Metals

22D-40. Le collage des alliages légers. (Bonding Light Alloys.) Pierre Prévot. *Revue de l'Aluminium,* v. 26, Apr. 1949, p. 123-130.

Possibility of use of synthetic-resin bonding as a substitute for riveting and welding in structural design. Shearing stresses of 2850-5700 lb. per sq. in. have already been attained. Results of a detailed theoretical and experimental study of such joints. (To be continued.)

22D-41. Welded Joints in Thick Aluminum Plates. C. B. Voldrich. *Welding Journal,* v. 28, June 1949, p. 275s-288s.

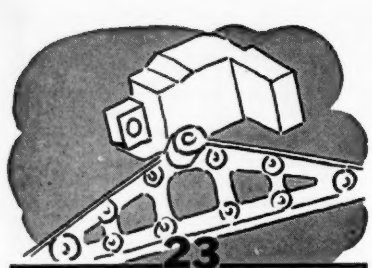
Materials tested and the welding method. Tests of argon-arc welds in 1½-in.-thick 3S plate showed that the welded joints had tensile-strength properties equal to those of the parent material, even at liquid-nitrogen temperature (−320° F.). Influence of welding heat on properties in regions remote from the weld area.

22D-42. How to Braze Aluminum. Floyd A. Lewis. *Iron Age,* v. 164, July 7, 1949, p. 78-82.

Brazing is applicable to long production runs and resulting joints are comparable in strength with welded assemblies. Types of Al which can be brazed, methods of brazing, types of filter material, fluxing procedures, and cleaning.

For additional annotations indexed in other sections, see:

7B-126-127; 12-133; 19B-116; 19C-16; 20A-286; 23A-17



APPLICATIONS

23A—General

23A-17. Metals for High Temperature Service. Ward F. Simmons and A. B. Westerman. *Metals Review,* v. 22, June 1949, p. 5-9.
Reviews the past year's literature in some detail, but also includes a few of the outstanding references appearing between 1945 and 1948. Information on welding, structure, and oxidation characteristics, also on the "ceramals" (powdered ceramic-metal compositions).

23A-18. Selecting the Closure Liner. Tracy Cowen. *Modern Packaging,* v. 22, June 1949, p. 149-152.
Available materials, including metallic foils, laminated films, varnish and resin coatings, calendered coatings, wax coatings, and miscellaneous liners or sealing materials. Liner backings and need for a universal liner.

23A-19. High-Temperature Materials for Aircraft Power Plants. R. A. Jones. *Technical Data Digest,* v. 14, July 1, 1949, p. 15-21.
Increased requirement for high efficiencies. Better design and temperature distribution and use of special cooling provisions, ceramic-coated metals, metal-ceramic materials, and ceramic materials.

23A-20. Materials Section. *Electronics,* v. 22, Buyers' Guide Issue, mid-June 1949, p. M1-M32.
Tabulates important electrical, mechanical, and other significant characteristics of most raw materials used by the electronics industry, for convenient use by designers of component parts, housings, and complete equipment.

23B—Ferrous

23B-28. A Review of the Properties of Magnetic Sheet Steel and Its Use in Engineering. D. Edmundson. *Sheet Metal Industries,* v. 26, June 1949, p. 1199-1204, 1214.

23B-29. Tests Scheduled Soon on Stainless Steel Coal Conveyor Belts. George F. Sullivan. *Iron Age,* v. 163, June 16, 1949, p. 133-134.
New development which may open up a 2500-ton a year market for stainless-steel strip and also cut coal-mining costs. Some problems remain to be solved.

23B-30. Quick, Watson, the Alloy! E. C. K. Read. *Steelways,* v. 5, May 1949, p. 28-31.
Type and requirements of steel alloys for various applications — fenders, pipes, rails.

23B-31. Improved Coke Quenching Car Built by Bethlehem Steel. *Industrial Heating,* v. 16, June 1949, p. 1082, 1084.
Use of car with an air conditioned cab, built almost entirely of Mayari R low-alloy, high-strength steel.

23B-32. Shineless Stainless Steel. Ann E. Ewing. *Science News Letter,* v. 55, June 18, 1949, p. 394-395.
Black rustless steel and its applications both for military purposes, where its unreflecting surface affords safety against the enemy, and for jewelry.

23B-33. Alloy-Steel Bits Tested at Morenci. L. Ormsby. *Mining Engineering,* v. 1, sec. 1, July 1949, p. 30.
Tests on the above used in open pit mining.

23B-34. Power Plant Operates at 1050° F. *Iron Age,* v. 163, June 30, 1949, p. 64.
Use of high-temperature steels in the new Sewaren, N. J., steam power station of Public Service Electric and Gas Co., which has made it possible to generate power at low cost by operating at a steam temperature 50° F. higher than any other power-plant installation in the world.

23B-35. Mild Steel in Ship Construction. W. Barr and A. J. K. Honeyman. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 92, Dec. 1948, p. 73-106; discussion, p. 107-112, also Jan. 1949, p. 113-121.
An extensive discussion beginning with historical development of use of steel instead of wrought iron. Reviews recent work on brittle fracture of welded ships. Charpy and Izod impact-test machines and their use; effects of production variables: deoxidation, rolling, heat treatment, and composition; application of quench or precipitation aging and strain aging; effects of variations in test conditions; effects of welding; and effects of design changes. Practical recommendations. 26 ref.

23B-36. Metals Used in Oil Refining; Comparative Resistance to Heat, Stress and Oxidation. W. I. Pumphrey. *Chemical Age,* v. 60, June 11, 1949, p. 853-856.
A general discussion. 13 ref.

23B-37. Fabrication des corps broyants de cimenterie. (Production of Grinding Media for Cement Mills.) Henry Gernelle. *Fonderie,* Mar. 1949, p. 1521-1524.
Establishes the main qualities required by grinding balls for ball mills. A series of different steels for this use are proposed on the basis of production experience. Optimum compositions of balls for different types of mills.

23B-38. Sonderstähle und Legierungen fur hohe Temperatur. (Special Steels and Alloys for High Temperatures.) E. Siebel and N. Ludwig. *Konstruktion,* v. 1, No. 1, 1949, p. 13-26.
The most suitable steels for construction of steam engines, turbines, and boilers were investigated by study of their creep-stress, corrosion, and scaling resistances and permanent expansions at elevated temperatures. Special attention is given to effect of alloy additions on high-temperature properties. 36 ref.

23C—Nonferrous

23C-41. Copper on Mammoth Industrial Building. *Sheet Metal Worker,* v. 40, June 1949, p. 37-38, 102.
Use of 30 tons of 16-oz. copper sheet on a large new tin-can factory.

23C-42. Tungsten Carbide Bits for Blockholing at Ajo. Alfred T. Barr. *Mining Engineering,* v. 1, sec. 1, July 1949, p. 28-29.
Tests on the above used for open pit mining.

23C-43. Where Credit Is Due. *Die Castings,* v. 7, July 1949, p. 24, 68-69.
Die-cast parts for a manually operated printing machine used in the retail credit system.

23C-44. Oil Heater Fittings. *Die Castings,* v. 7, July 1949, p. 27-28, 64.
Special fittings die cast in zinc. They are less expensive than sand cast or forged fittings, but equally serviceable.

23C-45. The Cold War. *Die Castings,* v. 7, July 1949, p. 30-32, 62.
Cams, sprockets, and other driving parts for mechanism used to kill airborne germs and viruses. Parts are die cast in Zn.

23D—Light Metals

23D-58. Light-Alloy in the Petroleum Industry. *Light Metals,* v. 12, May 1949, p. 284-289.
Use of Al-alloys in refinery equipment. Corrosion hazards. 10 ref. (To be continued.)

23D-59. Light-Alloy Pistons. *Light Metals,* v. 12, May 1949, p. 297-300. Based on FIAT Review of German Science, "Non-Ferrous Metallurgy. Part 1. Aluminum Piston Alloys", by C. Englisch, E. Schmid, and R. Weber.
Use of Al-Cu, Al-Cu-Ni, Al-Si, Al-Cu-Si, and Al-Mg alloys by the Germans during the war. Composition and mechanical properties. 17 ref. (To be concluded.)

23D-60. The Structural Uses of Aluminium in Buildings. W. C. Devereux. *Engineering,* v. 167, May 27, 1949, p. 501-504. A condensation.
Pertinent properties, including corrosion resistance and mechanical properties.

23D-61. The Brabazon Prototype: A Survey of Some of the Fabrication & Assembly Methods in Use on the World's Largest Aircraft. A. W. Morgan. *Sheet Metal Industries,* v. 26, June 1949, p. 1217-1226.

23D-62. Magnesium for Commercial Transportation. George H. Found. *Modern Metals,* v. 5, June 1949, p. 26-30.
The most important phases of transportation as they apply to current and projected uses of magnesium.

23D-63. Cast Aluminum Letters. *Modern Metals,* v. 5, June 1949, p. 32.
Use on store fronts and other sign applications.

23D-64. Magnesium Hoist of Novel Design. *Light Metals,* v. 12, June 1949, p. 304-306.

23D-65. The Century Theatre. *Light Metals,* v. 12, June 1949, p. 317-321.
Design and construction of a mobile theater unit built of aluminum alloy.

23D-66. New Pattern Treadplate. *Light Metals,* v. 12, June 1949, p. 321-322.
Al plate gives a positive grip in any direction. Pattern is deeper than on usual plating, insuring longer life.

23D-67. Light-Alloy in the Petroleum Industry. *Light Metals,* v. 12, June 1949, p. 335-344.
Continues discussion of sprayed Al coatings. Use of Al for condenser tubes and heat exchangers at refineries. (To be continued.)

23D-68. Airborne Lifeboat in Light Alloy. W. H. Dann. *Light Metals,* v. 12, June 1949, p. 345-355.
Advantages of Al as a structural material. Design, production, and operation.

23D-69. Improved Ultrasonic Delay Lines. Frank A. Metz, Jr., and Walther M. A. Andersen. *Electronics,* v. 22, July 1949, p. 96-100.
Comparative properties of various metallic and nonmetallic delay-line materials used to store intelligence for periods of several milliseconds and used in high-speed digital computers and other devices. Several

forms of magnesium, 2S-O aluminum, molybdenum, tungsten, fused quartz, pyrex, and plate glass were studied. Forged Mg-alloy lines proved superior.

23D-70. Aluminium Alloys for Shipbuilding. J. Lenaghan. *Engineering,* v. 167, June 17, 1949, p. 571-572.

23D-71. Magnesium Used as Structural Material. J. P. Donald Garges. *Aviation Week,* v. 51, July 4, 1949, p. 26-27, 29-30.

Redesigned magnesium F-80 wing reduces number of pieces to 31% and number of fasteners to 38% of those required by an Al alloy wing.

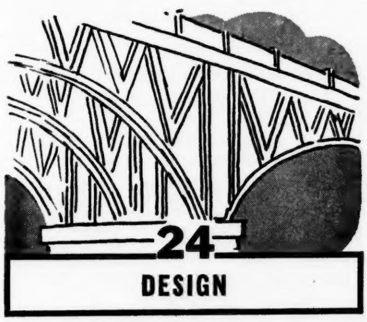
23D-72. Le pont du Hendon Dock a Sunderland. (Hendon Dock Junction Bridge.) Jean Romeyer. *Revue de l'Aluminium,* v. 26, May 1949, p. 158-162.

Construction of aluminum double-leaf trunnion bascule-type bridge at Hendon Dock, Sunderland.

23D-73. Magnesium Castings for Cost Reduction. *Electrical Manufacturing,* v. 44, July 1949, p. 98-101, 178, 180.

As applied to electrical equipment, appliances, and business machines.

For additional annotations indexed in other sections, see:
3B-137; 3C-134; 6A-80



24A—General

24A-98. Thermal Stresses in a Rectangular Plate Clamped Along an Edge. B. J. Aleck. *Journal of Applied Mechanics,* v. 16 *(Transactions of the American Society of Mechanical Engineers,* v. 71), June 1949, p. 118-122.

A mathematical analysis. Applications are bi-material constructions, where the stiffnesses of the components are not of the same order of magnitude, and the coefficients of expansion are different. Examples are thin layers of plastic bonded to metal, and thin glazes on ceramic tiles. Brittle lacquers in experimental stress-analysis are often subjected to a similar state of stress.

24A-99. Dynamic Capacity of Rolling Bearings. Gustaf Lundberg and Arvid Palmgren. *Journal of Applied Mechanics,* v. 16 *(Transactions of the American Society of Mechanical Engineers,* v. 71), June 1949, p. 165-172. Condensed from *Acta Polytechnica* (Mechanical Engineering Series), v. 1, no. 3, 1947.

Comprehensive theory for fatigue failure in rolling bearings. The character of the failures is analyzed, and effect of the volume of stressed material is assessed by means of a modification of Weibull's statistical theory. Variables affecting bearing capacity and general formulas relating the variables to the capacity. Unknown exponents were evaluated experimentally and final formulas compared with results.

24A-100. The Effect of Fit and Truncation on the Strength of Whitworth Threads Under Static Tension. C. W. Smith and A. C. Low. *Machinery* (London), v. 74, June 16, 1949, p. 817-823.

Experimental work to determine whether or not a design change made to facilitate U. S. production of the threads had any serious effect on strength. The decrease in strength does not appear to be excessive.

24A-101. Die Grenzzustände statisch beanspruchter Stoffe. (The Limiting States of Statically Stressed Materials.) (Concluded.) C. Torre. *Schweizer Archiv fur angewandte Wissenschaft und Technik,* v. 15, May 1949, p. 145-158.

A mathematical method for determining the above, including the mechanics of limiting stresses, the true limiting curve, and calculation of the slip-band regions. 39 ref.

24A-102. Experimentelle Ermittlung der statischen Zugkraftverteilung der Niete in Knotenpunkten bei einreihiger Nietung. (Experimental Determination of Tensile Strength Distribution of Rivets at Nodal Points of a Single Row of Rivets.) E. von Burg. *Schweizer Archiv fur angewandte Wissenschaft und Technik,* v. 15, May 1949, p. 137-145.

Test arrangement and measuring method are described and results evaluated from the standpoint of the designer of riveted structures.

24A-103. Significant Stress and Failure in Static and Fatigue Loading. Charles Lipson, G. C. Noll, and L. S. Clock. *Product Engineering,* v. 20, July 1949, p. 130-135.

Effects of type and mode of loading on significant stress as related to failure of machine parts, and the effect of abrupt changes in shape on stress distribution. Factors for geometric stress concentration, fatigue-stress concentration, and notch sensitivity are evaluated in terms applicable to the determination of design stresses for finite and infinite life.

24B—Ferrous

24B-34. A Survey of Car Body Production Methods at Vauxhall Motors Ltd. (Continued.) Maurice J. Seymour. *Sheet Metal Industries,* v. 26, May 1949, p. 1009-1013; June 1949, p. 1255-1258.

May issue, broad principles of the working of the die shop, and some of the problems encountered in the manufacture of large dies for contoured skin panels. June issue, a variety of problems connected with the manufacture, tryout, and maintenance of metal jigs and welding equipment used in mass producing the modern motor vehicle.

24C—Nonferrous

24C-10. Die Casting Die Design. Part IV. H. K. Barton and James L. Erickson. *Tool & Die Journal,* v. 15, July 1949, p. 56, 58, 60-61.

Design of sprues, runners, feeds, gates, overflows, and vents. Terms are defined. (To be continued.)

24C-11. No Slip-Ups. *Die Castings,* v. 7, July 1949, p. 19-20, 69-71.

Design and casting of parts for an electrode unit used to weld a criss-cross pattern on steel floors to prevent slipping.

24D—Light Metals

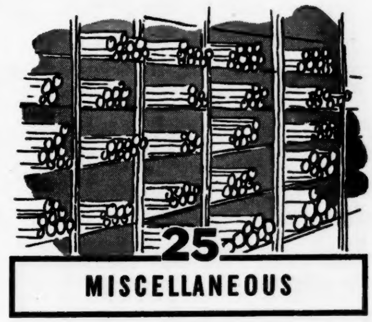
24D-11. Magnesium Design Principles. Gilbert C. Close. *Light Metal Age,* v. 7, June 1949, p. 8-9, 22-23.

Accurate stress analysis, notch sensitivity, die casting, extrusion, welding, and corrosion resistance.

24D-12. Water Valve Redesigned for Easier Assembly. *Die Castings,* v. 7, July 1949, p. 22-23, 67.

Design and fabrication from aluminum die casting.

For additional annotations indexed in other sections, see:
14C-57; 19A-156-157-168; 20A-260-262-297; 20B-85; 22A-142; 22B-224; 23D-64-68-71



25A—General

25A-108. The Drop Forge Industry Today: A Look Ahead. Part I. Robert E. W. Harrison. *Steel Processing,* v. 35, May 1949, p. 252-255.

Present situation, trends, and future prospects. (To be continued.)

25A-109. Reibung und Schmierung. (Friction and Lubrication.) H. Stäger. *Schweizer Archiv fur Angewandte Wissenschaft und Technik,* v. 15, Apr. 1949, p. 97-116.

Factors affecting the wear and wear resistance of moving parts. Theory and methods of reducing wear by means of cooling and friction-reducing lubricants. 13 ref.

25A-110. Where to Find Information on Mineral Raw Materials. M. M. Leighton. *Chemical Industries,* v. 64, June 1949, p. 930-931.

Listing of sources. Cites examples from the work of the Illinois State Geological Survey. 99 ref.

25A-111. Metals Lab at C.N.R. Handles Many Problems. *Canadian Metals and Metallurgical Industries,* v. 12, June 1949, p. 16-17, 37-38.

Equipment and problems worked on at laboratory of Canadian National Railways.

25A-112. Book-Length Biographies of Engineers, Metallurgists and Industrialists. Thomas James Higgins. *Illinois Institute of Technology,* 14 pages.

Results of a decade of searching and recording the above written in English. Books are listed according to subject heading.

25A-113. (Book) **Research in Industry.** 84 pages. 1948. His Majesty's Stationery Office, London, England.

Consists of the following articles, by separate authors, from *The Board of Trade Journal:* How Science Can Help Industry; Cotton; Glass; Wool; Rayon; Pottery; Iron and Steel; Electronics; Lace; Linen; Boots and Shoes; Paint; Furniture; The Electrical Industry and Consumer Goods; Plastics; Machine Tools and Small Tools; Light Engineering; Industrial Design; Radar.

25B—Ferrous

25B-31. The Future Locational Pattern of Iron and Steel Production in

the United States. Walter Isard and William M. Capron. *Journal of Political Economy,* v. 57, Apr. 1949, p. 118-133. (Reprint.)

Tentative generalizations. Fuel economies, ore reserves, scrap supply, transportation, labor, and market. 53 ref.

25B-32. Austenitic Manganese Steel. Howard S. Avery. *American Brake Shoe Co.,* 1949, 50 pages.

Originally prepared for the American Society for Metals' 1948 edition of the Metals Handbook, where a somewhat condensed version may be found. The alloys, applications, structure, properties, machining, working, and welding. 33 ref.

25C—Nonferrous

25C-38. Various Aspects of Titanium Metals. R. S. Stewart. *Canadian Mining Journal,* v. 70, June 1949, p. 59-66.

Resources, production, properties, applications, and the Ti-base alloys. 32 ref.

25C-39. The Shifting Scene in Lead Market. Robert L. Ziegfeld. *Metals,* v. 19, June 1949, p. 11-12, 14.

Economic trends.

25C-40. Should Copper Enter U. S. Duty Free? "Yes" Say Consumers of the Metal. C. Donald Dallas and Roger E. Gay. **"No" Says Arizona Copper Tariff Board.** *Metals,* v. 19, June 1949, p. 6-7, 9-10.

25C-41. Recent Developments in Titanium and Titanium Alloys. *Steel,* v. 124, June 20, 1949, p. 100-104, 132, 135; June 27, 1949, p. 58-61, 92, 94.

Developments reported at recent technical meetings.

25C-42. America's Stake in World Mineral Resources. Alan M. Bateman. *Mining Engineering,* v. 1, sec. 1, July 1949, p. 23-27.

War minerals imported, shortages in reserves, foreign sources needed, politics abroad and their threat to supplies, need for mineral foreign policy, and trade barriers.

25C-43. Twenty-Ninth Annual Report. *British Non-Ferrous Metals Research Association,* June 1949, 52 pages.

Review of research progress for 1948-49 under the headings; copper, nickel and their alloys; aluminum, magnesium and their alloys; lead, tin and their alloys; zinc and galvanizing; and general research. Also outlines research in progress.

25C-44. (Book) **Nichteisen-Metallkunde.** (Non-Ferrous Metallurgy). Part I. Max Hansen, senior author. 207 pages. 1948. Office of Military Government for Germany. (FIAT Review of German Science, 1939-1946.)

Presents material in two sections, each consisting of reviews of specific topics by individual authors, and covering German work during the above period. The first deals with the production and refining of nonferrous metals. Separate subsections cover Ca, Be, Mg, Al, Ti, Zr, Th, U, Mn, Ni, Cu, Zn, Cd, In and Th, Si, Pb, Sb, light-metal-scrap treatment and refining, and metal production by hydrogen reduction from oxides which are difficult to reduce. The second gives details of properties and processing of Be, Mg, Al, and their alloys. Voluminous footnote references indicate all original sources.

25C-45. (Book) **Nichteisen-Metallkunde.** (Nonferrous Metallurgy.) Part II. Max Hansen, senior author. 171 pages. 1948. Office of Military Government for Germany. (FIAT Review of German Science, 1939-1946.)

Second of two volumes. Part of a series reviewing all branches of German science for the above period. Individual topics are reviewed by separate authors. Main topics are Ni and Ni alloys; Cu and Cu alloys; precious metals and their alloys; Zn and Zn alloys; Pb and Pb alloys; bearing metals; powder metallurgy and sintered materials; and melting and casting in vacuum. Besides voluminous footnote references, the book concludes with a 4½-page book bibliography.

25C-46. (Book) **Year Book of the American Bureau of Metal Statistics.** Ed. 28. 112 pages. 1949. American Bureau of Metal Statistics, 50 Broadway, New York.

Production, consumption, and operation data; data on imports and exports of the U. S. and the United Kingdom; and price data for copper, lead, and zinc. Some data on gold, silver, and various other metals.

25D—Light Metals

25D-25. Kaiser Aluminum: A Major Supplier in Three Short Years. W. B. Griffin. *Modern Metals,* v. 5, June 1949, p. 15-25.

Over-all organization and administration of firm as well as specific procedures and equipment used during the transition from bauxite to a large variety of finished products. Various examples of consumer products in aluminum.

AVOID DELAY AT THE REGISTRATION DESK

See page 61 for Metal Show Advance Registration Coupon

NEW PRODUCTS *in Review*

850. Large Carbon Brick

A larger size carbon brick recently announced offers many advantages that are combinations of the material characteristics and the physical size.

Made in the large size of 13½ x 6 x 3 in., they are quicker to lay up, have fewer joints to cement, and make a sounder job. They weigh only 14.4 lb. (20 to 45% lighter than ceramics) and therefore are easier to handle. Carbon has no melting point and retains its strength at metalworking temperatures. It is highly resistant to slag attack and immune to thermal shock.

Other new sizes of carbon brick are also available. A new key brick, measuring 13½ x (6-5) x 3 in. weighs 13.2 lb.; the 9 x 6 x 3-in. straight brick weighs 9.5 lb.; and the 9 x (6-5⅜) x 3 key brick weighs 9.1 lb.

For further information write C. G. Ollinger, National Carbon Co., 30 East 42nd St., New York 17, or use coupon on page 57, circling No. 850.

851. Combustion Boat

The Lecotherm ceramic combustion boat is a light-weight, one-use boat, employed without bedding material for rapid carbon and sulphur combustion analyses. It is free of carbon and sulphur and does not require preliminary "burning off" to remove the blank. It possesses heretofore unobtainable resistance to slag penetration.

Because the boats are individually wrapped in units of ten, a small number of them can be used without exposing to contamination the remaining boats in the master carton of 1000.

For further information write H. J. Schmitt, Laboratory Equipment Corp., St. Joseph, Mich., or use coupon on page 57, circling No. 851.

852. Sand Specimen Tube

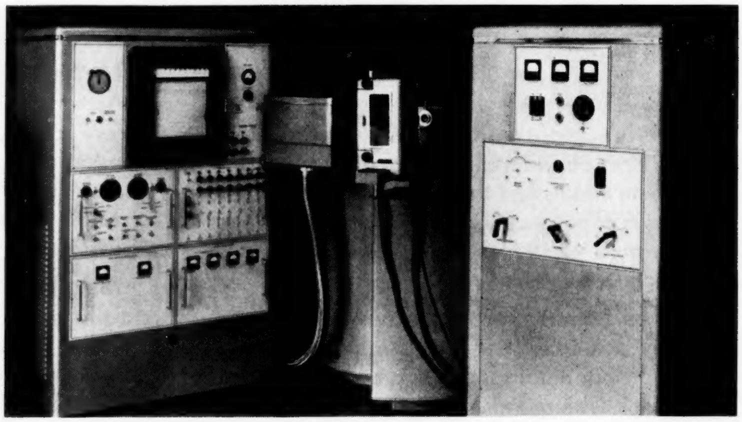
Recent studies made with a view to increasing the precision of sand testing have shown that the condition of the specimen tube is of prime importance. Small irregularities in the bore of the tube create frictional resistance to the ramming energy sufficient to cause appreciable errors in strength and permeability tests.

The No. 305 precision specimen tube is honed to a finish of 3 to 6 microinches r.m.s. and close dimensional tolerance. These tubes are fully hardened and will retain their accuracy over long periods of use.

For use as a reference standard the No. 315-18 master precision specimen tube is of specially selected accuracy and fitted with a self-contained desiccator and closure to preserve the finish indefinitely.

For further information write Jess Toth, Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, or use coupon on page 57, circling No. 852.

853. Quantometer Adapter—Source Unit



Since the introduction of the Quantometer by the Applied Research Laboratories considerable interest has been evidenced in equipment that would convert the standard spectrograph into a direct-reading instrument. Applied Research Laboratories has designed and is now producing the SQA (Spectrograph Quantometer Adapter) line of adapters which may readily be attached to spectrographs already in the field.

Owners of ARL spectrographs can set up for direct reading analysis at a minimum cost. In addition to the basic circuits, the SQA contains all of the auxiliary circuits found to be successful in the original direct-reading Quantometer.

A new spectrographic source unit has also been designed by Applied Research Laboratories to provide the routine control laboratory with a relatively inexpensive dual-purpose source. The Spark-Arc Source Unit (shown at right) is built to fill the requirements of most laboratories for two source units, one for the precision analysis of elements at the higher concentrations, and a second unit intended for high-sensitivity trace analysis.

For further information on either of these products write William E. Davis, Applied Research Laboratories, 4336 San Fernando Rd., Glendale 4, Calif., or use coupon on page 57, circling No. 853.

854. Electroanalyzer

New design features of the Cenco electroanalyzer provide convenience and save time in quantitative measurements of the electrodeposition of metals.

Six sets of fixed anode-cathode positions permit simultaneous determinations. Air or gas agitation is controlled at each station. A selector switch is provided for reading voltage at any station. A maximum of 5 amp. direct current can be applied to any or all of the stations. Single stations may be quickly removed with the snap of a switch. Current flowing through the circuit is controlled by a knob on the front panel. A voltmeter reading of 0 to 8, and an ammeter reading 0 to 5 are mounted on the front panel. Polystyrene electrode holders operate with finger pressure to support the electrodes.

For further information write G. C. Godejahn, Central Scientific Co., 1700 Irving Park Rd., Chicago 13, or use coupon on page 57, circling No. 854.

For more New Products See pages 59, 60, 62, 63

USE THE HANDY COUPON BELOW TO OBTAIN THIS FREE HELPFUL LITERATURE

MANUFACTURERS' LITERATURE

315. Castings, Beryllium Copper

Bulletin 11 entitled "Beryllium Copper Investment Casting" gives full data for the first time on economical use of precision-cast beryllium copper for industrial parts. Beryllium Corp.

316. Combination Burners

New 8-page catalog 409 of special interest to industrial plants burning oil or oil and gas in heat processing applications. Hauck Manufacturing Co.

317. Construction Engineering

New attractive, well - illustrated booklet on construction projects throughout the country as well as large-scale moving operations completed in various plants. Eichleay Corp.

318. Core Baking

Two new data sheets outline the fundamentals of electronic core-baking and describe how the new resin binder is used to great advantage. New data sheets will follow each month. Induction Heating Corp.

319. Electrodes, Container

Announcing a new Arcaloy AC-DC stainless electrode and new all-steel, moisture-proof and grease-proof container. Packed in containers made to simplify stock problems, these new electrodes produce the cleanest welds in the industry. Alloy Rods Co.

320. Forging Rods

"Titan Forging Rods and Shapes" is the title of a new folder giving the chemical compositions of ten brass and bronze alloys used. Typical brass forgings are illustrated. Titan Metal Mfg. Co.

321. Gas Burners

Bulletin 58 describes, with burner charts and drawings, certified combustion made possible with new series of gas burners. North American Mfg. Co.

322. Gas Pumps

Bulletin 32-33-B-13 gives full details on Rotary Positive Gas Pumps, illustrating four standard types with sectional drawings and photos of typical installations. Roots-Connersville Blower Corp.

323. Hardening, Flame

Latest copy of Tempil Topics gives a concise summary of the flame hardening process. Tempil Corp.

324. Heat Treating

Five booklets now available describe fully with interesting illustrations the different heat-bath processes including carburizing, tempering, and a superior black finish. Heatbath Corp.

325. Irons, Silicon

New data collected over ten to fifteen years on two corrosion resistant high silicon alloys, Duriron and Durichlor, now available in bulletin 113. Duriron Co., Inc.

326. Laboratory Equipment

Literature available on four new developments in laboratory equipment, including new Lectrotherm combustion boats. Laboratory Equipment Corp.

327. Press, Hydraulic

Straightening, forming, broaching and assembling operations all competently and economically handled by the new hydraulic metalworking press just developed. Niagara Machine & Tool Wks.

328. Surface Control

New 8-page bulletin gives numerous practical advantages of shop control for surface roughness and waviness. Write for "More Profits to You Through Surface Control". Physicists Research Co.

329. Technical Course

Complete training course for technical service representatives attractively presented in special 40th anniversary issue of house organ. Series of photographs follow trainees through the most interesting phases of the course from laboratory to field work lectures. Oakite Products, Inc.

330. Tube Furnace

New electric tube furnace especially designed for general research work. Materials can be tested to maximum temperature and cooled quickly. Bulletin gives full description and also typical heating and cooling curves. Harper Electric Furnace Corp.

331. Valves

Bulletin 711 includes the latest information on forged steel relief valves, designed for basic steam, oil or vapor working pressure of 600 lb. at 850° F. Edward Valves, Inc.

332. Wire

New 7-page booklet furnishes latest information on Colmonoy Spraweld Wire designed for use in standard metallizing guns. Wall Colmonoy Corp.

READER SERVICE COUPON

Metals Review, August, 1949

Circle these numbers for manufacturers' catalogs described on this page.

315	317	319	321	323	325	327	329	331
316	318	320	322	324	326	328	330	332

Circle these numbers for information about new products described on pages 56, 59, 60, 62, 63.

850	852	854	856	858	860	862	864	866	868	870
851	853	855	857	859	861	863	865	867	869	871

This coupon is void after Nov. 15, 1949

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EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

East

METALLURGICAL SALES DEVELOPMENT: Attractive and responsible position in Chicago for a graduate metallurgical engineer, 32 to 38 years old, who has had experience in the processing and application of alloy steel. Box 8-5.

RESEARCH METALLURGIST: To plan and carry out fundamental research on fracture and deformation of metals. Research experience or Ph.D. desired. Government laboratory—freedom to publish. New England. Box 8-10.

DISTRIBUTOR OF QUALITY STEELS: In New York metropolitan area, has opening for young, experienced metallurgical sales engineer in stainless, alloy, tool and carbon steel distribution. Full knowledge of heat treating and ability to give metallurgical instruction to other members of the organization. Must have pleasing sales personality and real metallurgical ability and experience. Excellent opportunity for advancement. State age, experience, education, starting salary desired. Box 8-15.

SALES DEVELOPMENT ENGINEERS: By manufacturer of stainless and alloy wire, rod and strip for Philadelphia and New York territory. Both recent graduates and those with metallurgical, chemical or mechanical engineering experience will be considered. Box 8-20.

METALLURGISTS: For duty in various Federal agencies in the States of Pennsylvania and Delaware. Classification (grades P-2 to P-5) dependent on educational and work background. Physical metallurgists for development and research work on structure and properties of metals and alloys; metallurgist for investigations in the welding field; several in metals protection and corrosion, and others for research and development aspects of the melting and casting of metals and alloys. U. S. Civil Service Examiners, Naval Air Material Center, U. S. Naval Base Station, Philadelphia 12, Pa.

Midwest

METALLURGIST SALES DEVELOPMENT: Attractive position available in Detroit for a graduate metallurgical engineer who is 30 to 36 years old and who has experience in the production of cast iron. Box 8-25.

METALLURGIST: With experience in farm implement manufacturing, for position in small plant in Midwest. State experience and salary desired. Box 8-30.

STRESS ANALYST: Capable of supervising activities of a small group assigned to product improvement and failure analysis. Must be capable of doing structural analysis. Give education, age, experience and salary required. Box 8-35.

POWDER METALLURGIST: Excellent opening for young engineer with experience in research or development in powder metallurgy. Prefer man with advanced college training but not essential. Should be able to initiate and execute over-all research program. Interest and experience in technical writing desirable. Metals Department, Armour Research Foundation, Chicago 16, Ill.

South

RESEARCH-MINDED YOUNGER MAN: With doctorate, wanted by southern engineering school to join research staff. Previous research record desired. Opportunity to develop program in problems of own interest. Salary attractive. Box 8-40.

West Coast

DISTRICT SALES MANAGER: Pacific northwest. Knowledge of electric welding. Willing to travel extensively in own car. Working with and educating distributors selling nationally known steel products for maintenance and repair of construction, mining, quarry equipment. Salary and commissions. Write qualifications. Box 8-45.

POSITIONS WANTED

MANAGER OR EXECUTIVE ASSISTANT: Desires position with progressive company where results will be rewarded. Experienced as chief metallurgist in automotive plant, production manager, works manager and executive assistant of alloy foundry producing heat resistant, stainless and special alloy castings. Box 8-50.

POWDER METALLURGIST: Nine years' experience in production. Powder metallurgy fabrication of parts from iron, copper, bronze, brass, steel and magnetic alloys. Excellent background in plant setup, management and operation. Three years' research and development. Tool design, press setup, process specification, control and cost analyses. B.S. in metallurgical engineering, married, age 34, locate anywhere. Box 8-55.

METALLURGIST: Veteran, age 29, married. B.S. in metallurgy from Midwest university. Three and one-half years' experience in foundry supervision includes foundry installation, melting, casting, cold work, heat treating and quality control. Desires responsible position in Midwest or West in foundry development or process control. Available immediately. Box 8-60.

SERVICE ENGINEER OR METALLURGIST: Thirteen years' responsible metallurgical experience in nonferrous tubing, malleable foundry, automotive parts and cutting tools. Has held positions of chief metallurgist and research engineer. Familiar with service and customer contact work. Good appearance and personality. Age 35, married. A.B. and B. Ch.E. degrees. Registered engineer in Michigan. Box 8-65.

METALLURGIST: B.S. in metallurgical engineering, age 24. Two and one-half years' recent experience in metallography, materials control and physical testing; ferrous and nonferrous alloy sales or materials control position desired. Eastern location preferred. Box 8-70.

JUNIOR METALLURGIST: June 1949 graduate with B.S. in metallurgical engineering. Age 24, single, veteran. Experience as research assistant and general factory work. Desires nonferrous process metallurgical work. Location open. Box 8-75.

METALLURGIST: Age 29. Degree in metallurgical engineering. Experienced in physical testing, assay work, electrolytic silver-gold production, and in experimental powder metals laboratory for a short time. Desires position in or leading to production work in Midwest or eastern U. S. Box 8-80.

TECHNICAL LIBRARIAN: B.S. in library science. Three years' business experience in administrative capacity with wholesale fabrics house. Three years as research librarian with large steel company. Activities—abstracting, editorial work, indexing, patents, report writing. Box 8-85.

METALLURGICAL ENGINEER: B.S. in metallurgical engineering, age 33. Seven years' experience in aircraft manufacturing plant has included metallography, failure analysis, radiography, heat treatment of ferrous and nonferrous alloys; group leader of metallurgical and X-ray laboratories, research and development, and specification writing. Desires position in development and research or production. Prefers West Coast or East. Box 8-90.

GRADUATE METALLURGIST: Long accustomed to fully responsible positions in research, process and quality control, with background of 12 years in steel production and 12 in fabrication including aircraft, will consider any reasonable offer and any position enabling him to contribute fully to his employer's success. Box 8-95.

SALES ENGINEER: B.S., age 46, married. Will travel or relocate. Experienced selling all heat treat items, salts, oil. Also black finishes, welding and induction units. Northern Ohio preferred. Box 8-100.

EXECUTIVE METALLURGIST: Broad manufacturing background in metals and finished products, and over-all experience in management, internal problems, reorganization, sales, research, cost and quality control, plant layout, and modern production line technique. Sufficiently experienced for maximum responsibility. Seeks executive or consulting activity. Any location and willing to travel. Immediately available. Box 8-105.

WANTED—USED MICROSCOPES

One metallurgical microscope and possibly auxiliary polishing equipment; one binocular microscope, arm suspended. Send descriptions and prices to Box 8-1, Metals Review.

METALLURGIST: B.S. in chemical engineering and M.S. in metallurgy. Age 34. Nine years' metallurgical experience in truck engine plant. Production and inspection control, physical testing, chemical analysis, process and material specification, induction hardening and brazing, powder metallurgy research. Some foundry experience. Now interested in production, research or development position. Resume available. Box 8-110.

METALLURGICAL ENGINEER: 28 years old, married, family. Excellent experiences in all types of heat treatment, failure investigation, laboratory supervision, specification and report writing, steel selection. Satisfactorily employed but seeks better position as chief metallurgist or assistant metallurgist of medium or small-sized manufacturing plant located in east. Particulars on request. Box 8-115.

ENGINEERING GRADUATE: B.S. in industrial arts, June 1949. Age 32, married, one child. Courses in physical metallurgy, metallography and physical chemistry. General machinist in Army for six years. Four years' experience in automobile repair. Desires position in metal fabrication, heat treating, metallography and process development. Box 8-120.

METALLURGICAL ENGINEER: Age 28, single. Six and one-half years' of practical experience and training. Desires position in metallurgical laboratories doing metallographic work, physical testing, heat treatment, trouble shooting, inspection or sales. Interested in customer contact, also. Will travel anywhere if conditions are acceptable. Box 8-125.

METALLURGIST: Fifteen years' experience in the testing and fabricating of metals. B.S. in metallurgical engineering, Case Institute of Technology, 1934. Specialist in the induction hardening and brazing of metals, covering materials, processing and fixture design. Has set up laboratory and production departments, specifying equipment processes and training of key personnel. Box 8-130.

MACHINE DESIGNER: Registered professional engineer. B.M.E., M.M.E. from Cornell, age 30. Capable of designing special-purpose machines, product design, plant layout. Machine tool manufacturing background. Experienced in business procedures. Desires responsible position in progressive manufacturing company or consulting engineering firm. Prefers West Coast assignment. Box 8-135.

FOUNDRY METALLURGICAL ENGINEER: Eight years of practical experience in all phases of foundry metallurgy and foundry operation. Thoroughly familiar with melting, gating, sand, quality and process control, and the decrease of foundry defects for gray iron and aluminum castings. Extensive experience in physical testing, sand testing, and metallographic laboratory work. College graduate, age 31, excellent recommendations. Box 8-140.

ELECTROMETALLURGIST: Desires development or production work. Age 35, single, B. S. in electrochemical engineering, M. S. in metallurgy. Seven years of diversified experience in the electrolytic reduction of aluminum, lithium, and sodium. Box 8-145.

SALES METALLURGIST: And chemist. Total of 26 years' experience in metallurgical fields. Fourteen years in foundry included supervision in several capacities. Familiar with brass, bronze, aluminum, magnesium, and gray iron practices. Now sales representative for foundry. Desires change due to present limitations. Age 44, married. Box 8-150.

METALLURGICAL ENGINEER: Married. M.S. in metallurgy from Stevens Institute of Technology, 1948. Thesis in powder metallurgy. Experience in laboratory and production. Twelve years in ferrous and nonferrous metals industries. Seven years at research laboratory. Desires position in East. Complete resume of experience on request. Box 8-155.

MECHANICAL ENGINEER: Metallurgy and materials background. Industrial experience in manufacture of machinery for processing metals; product evaluation, research, development, and tooling. Knowledge of modern tools, production methods, and metal treatments; record of reducing manufacturing costs through redesign. Desires responsible engineering position or will serve top management as consultant. East preferred. M.S. (M.I.T.); age 40; married; family. Box 8-160.

NEW PRODUCTS *in Review*

855. New Aluminum Plant

The Aluminum Alloy Division of the Vanadium Corp. of America is now in commercial production at a new plant in Chester, Pa.

A variety of aluminum-rich alloys is being made for use by the basic metal industries: metallurgical grades of aluminum for deoxidation of steel, and vanadium-aluminum, titanium-aluminum, and silicon-aluminum alloys for grain refinement and improvement in physical properties of commercial aluminum.

The plant contains the largest electric furnace ever built for the melting of aluminum, as well as a comprehensive spectrographic laboratory.

The Aluminum Alloy Division is the outgrowth of use of aluminum by the Vanadium Corp. of America in the manufacture of ferroalloys and in the production of other deoxidizers for steel.

For further information write Miss Gladys Kile, Vanadium Corp. of America, 420 Lexington Ave., New York 17, or use coupon on page 57, circling No. 855.

856. Packaged Plating Machine

A new self-contained packaged plating machine, known as the Cro-Plater, is a complete unit, fully wired and ready for operation on delivery. It is designed primarily for all types of chromium plating.

The machine is provided with a lead-lined Armco iron tank. It can

deliver up to 300 amp. under precision control not only of current, but of temperature. The unit is equipped with a blower which not only exhausts the fumes from the tank, but force-cools the copper oxide rectifiers.

The Cro-Plater can be used for other metals besides chromium, where the standard lead-lined tank is suitable. Plain steel, rubber-lined or other types of tank construction can be provided in special units. It is now made in one standard size, with a 45-gal. tank, 24 x 18 x 30 in., electrically heated by a thermostatically controlled unit, located outside and at the bottom of the tank. It requires a 220-volt, 3-phase, 60-cycle. 50-amp. input. A bank of six force-cooled copper oxide rectifier stacks delivers up to 300 amp. at 1 to 15 volts for the plating operation.

For further information write C. B. Kentnor, Jr., W. S. Rockwell Co.. 200 Eliot St., Fairfield, Conn., or use coupon on page 57, circling No. 856.

857. Smoke Abatement

An improved system for smoke abatement introduced by the Eclipse Fuel Engineering Co. utilizes the basic principle of forced air to eliminate objectionable smoke for all industrial applications. The formation of smoke or soot (hydrocarbon vapors heated to high temperatures without sufficient air) can be prevented only by complete combustion within the firebox. In order to bring about this condition, air must be forced through jets into the firebox. This creates a turbulence which causes more complete combustion before the volatile gases have a chance to break down into soot or smoke.

An overfired air jet system is the most efficient and inexpensive method of controlling smoke. When an Eclipse centrifugal pressure blower is used as the source of air supply, the actual operating expense (electric power) is proportional to the amount of air required. Operation is not continuous but only when needed.

The Eclipse plan of smoke abatement offers two different air jet systems—the single manifold and the double manifold. After such specifications as firing rate of the boiler, length and width of the grate and available floor space have been determined, the most suitable system is engineered to fit the specific application.

Controls for the systems may be either manual or automatic. Under visual-manual control, a push button station is used to start and stop the blower. Mirrors, if needed, are used for observation of the stack. If automatic control is desired, a photoelectric cell is installed in the stack and interconnected with the blower starter.

For bulletin or further information write A. D. Wilcox, Eclipse Fuel Engineering Co., Rockford, Ill., or use coupon on page 57, circling No. 857.

858. 2-Kw. Induction Heater

The woman operator of the new Sieco 2-kw. induction heater shown in the illustration holds the workpiece in her hand in complete safety. Work can contact the heating coil with no danger of electric shock and without upsetting the fast, uniform heating action of the high-frequency field.

The new heater uses vacuum condensers as well as the usual vacuum

power tubes. Although the current flowing in the heating coil is high (100 to 200 amp.) the operating voltage in the new circuit is exceptionally low (10 to 20 volts). The heating operation is completed in so few seconds that the heat does not have time to travel more than ½ inch down the rod.

Design improvements in the new Sieco heater speed soldering, brazing and hardening jobs. Heavy tool-type output terminals have interchangeable coil blocks. All controls are conveniently concentrated in the upper quarter of the front panel, leaving the center panel clear for work fixtures. Controls are positioned for quick and logical use. Forced air cooling eliminates bulky and expensive plumbing. Cooling air exits through a top cowl directed away from the operator. A removable lower panel gives instant access to fuses and to a special single-point adjustment which will match the entire machine to any single-phase factory line of 200 to 250 volts. Heavy casters provide easy portability. Jack studs at all corners facilitate leveling and locking to the floor.

For further information or illustrated literature write Sherman Industrial Electronics Co., 505 Washington Ave., Belleville 9, N. J., or use coupon on page 57, circling No. 858.

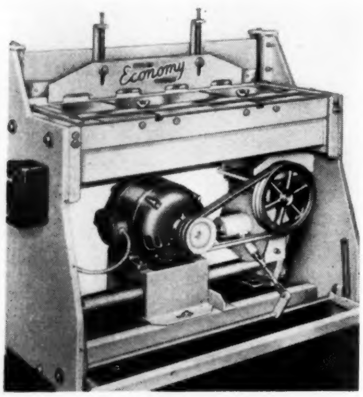
For more New Products See pages 56, 60, 62, 63

NEW PRODUCTS *in Review*

859. Power-Operated Shear

A new power-operated metal shear of 16-gage capacity incorporates a unique self-contained direct drive unit.

A departure in design from conventional power-operated shears of this size, the new Economy P-16 shear eliminates flywheels, brakes, fast-moving shafts and cam-operated connecting rods by utilizing the direct drive. The drive unit, which runs in oil, consists of precision-cut hardened steel worm and bronze worm gear units, sliding four-jaw clutch, driver



and cam, which gives the shear a smooth, direct action at a slight pressure on the foot treadle.

In one complete revolution, the knife bar is brought down smoothly and evenly for the cut and returned to top position. The cam-actuated rocker arm transmits power to the knife blade through two steel connecting rods, which are provided with turnbuckles for adjustment.

The operating cycle of the shear is 60 strokes per minute, but this can be varied, if desired. It is available in three cutting lengths—36, 42 and 52 in.

For further information write Acme Equipment Co., Inc., 126 South Clinton St., Chicago, or use coupon on page 57, circling No. 859.

860. Brazing Al to Steel

The Salkover group of commercial metal joining plants has recently developed a practical and economical method of brazing aluminum to steel. The technique is not only capable of forming a bond of great strength, but is simple and low in cost.

Possible applications include brazing of aluminum cooling fins to steel engine and compressor cylinders, and fabrication of assemblies in which the special properties of steel inserts are combined with the light weight and corrosion resistance of aluminum.

For further information write N. M. Salkover, Salkover Metal Processing, 321 Dixie Terminal Bldg., Cincinnati 2, Ohio, or use coupon on page 57, circling No. 860.

861. Laboratory Oven

The new Fisher forced draft Isotemp oven for general laboratory use is said to perform drying operations in one-half to one-third the time required with a conventional gravity-type oven. A uniform temperature is produced throughout the 10x12x12-in. aluminum heating chamber with a minimum consumption of current.

The new oven has a motor-fan unit beneath the heating chamber and an ingenious arrangement of ducts and louvres which conduct hot, dry air to the heating chamber where the air moves gently against and completely around the sample. Once the selected operating temperature (range 75 to 175° C.) is attained, the oven will maintain it within ± 1°.

Extra heavy glass wool insulation, aluminum shelving and a heavy cast housing insure stability and even heat distribution. Current consumption is 550 watts, and the oven draws current during only about one-fifth of the time after reaching preset temperature.

Safety features include a special latched door which will open should any pressure develop within the heating chamber. Thermostat elements are sealed in a capsule, heating elements are embedded in a refractory material, and the entire heating area is maintained at a relatively low temperature.

The Isotemp forced draft oven provides 400 sq. in. of shelf area. Tests show that samples can be dried

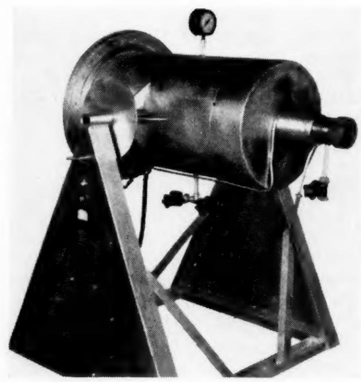
in about 90 min. as compared with 200 min. in a comparable gravity-type oven.

For further information write John Angus, Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, or use coupon on page 57, circling No. 861.

862. Molybdenum-Vacuum Furnace

High-temperature operation up to 3500° F., under a neutral or reducing atmosphere pure enough to sinter chromium without oxidation, is featured by the Model MO-224 molybdenum-vacuum electric furnace. Recommended average operating temperature is approximately 3300° F. with the maximum peak of 3500° F. for short cycles. The steel case of this unit is designed to maintain a vacuum of 30 in. of mercury. The furnace can be positioned either horizontally or vertically.

This dual-tube Pereco furnace is so constructed that the inner, or pri-



mary, tube containing the molybdenum element may be removed readily without disturbing the furnace proper. The element is designed to compensate for heat gradient at the tube ends.

The furnace is 28 in. long, with an inside diameter of 2 in. and an 18-in. controlled temperature length. It has one open end with a 10-in. vestibule or sight tube, and can be supplied with both ends open when required. The sight tube and face of the furnace are water cooled. A Pyrex or quartz sight lens is provided and may be removed or replaced quickly, so that thermocouples or other equipment may be mounted when desirable.

The Pereco MO-224 has connections for neutral or reducing atmospheres, vacuum, and water. Power input required is 6 kw., 220 volts, 60-cycle, single phase.

For further information write Andrew Pereny, Pereny Equipment Co., 893 Chambers Rd., Columbus 12, Ohio, or use coupon on page 57, circling No. 862.

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MAJOR PRODUCTS OF YOUR COMPANY AT YOUR PLANT ______________________

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1) MANAGEMENT ☐ 3) ENGINEERING ☐ 5) PURCHASING ☐

2) PRODUCTION ☐ 4) METALLURGY ☐ 6) SALES ☐ 7) ______________ OTHER

PLEASE CHECK BELOW, THE OPERATIONS CARRIED ON IN YOUR PLANT:

8) HEAT TREATING ☐ 10) MACHINING ☐ 12) METAL CLEANING ☐

9) FORGING, PRESSING ☐ 11) WELDING ☐ 13) FOUNDRY, FERROUS ☐ NONFERROUS ☐

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